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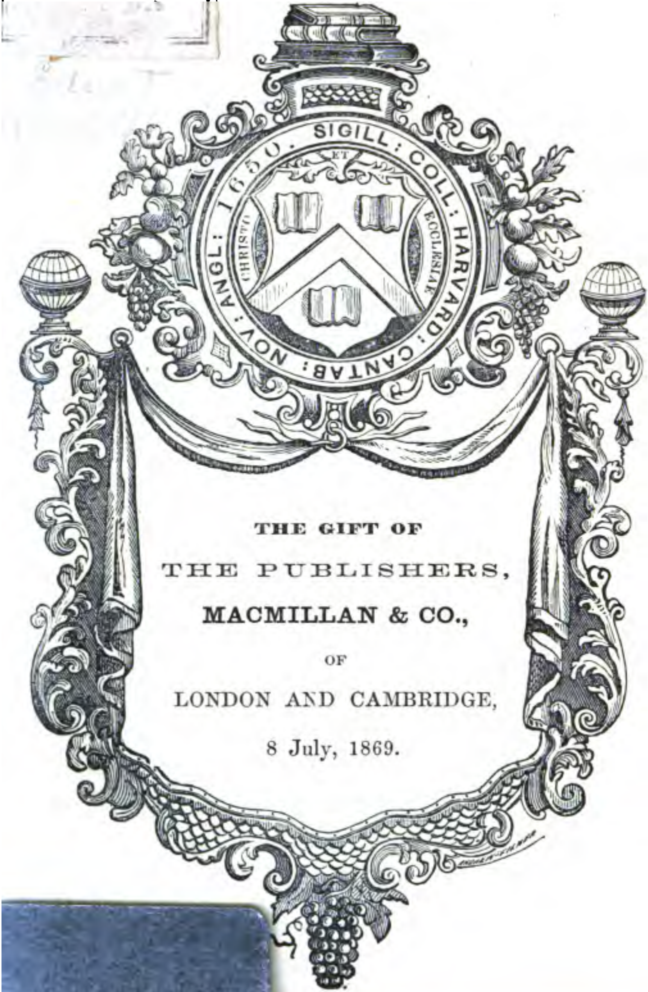
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TABLES OF WEIGHTS AND MEASURES.

TROY WEIGHT; *for weighing gold, silver, &c.*

24 Grains (grs.) make 1 Pennyweight (dwt.)
20 Pennyweights . . . . . 1 Ounce (oz.)
12 Ounces make 1 Pound (lb.)

APOTHECARIES' WEIGHT; *for weighing medicines.*

20 Grains (grs.) make 1 Scruple (sc.)
3 Scruples . . . . . . 1 Dram (dr.)
8 Drams make 1 Ounce (oz.)
12 Ounces . . . . . 1 Pound (lb.)

N.B. The grain, ounce, and pound in this weight are the same as in Troy weight.

AVOIRDUPOIS WEIGHT; *for weighing common goods.*

16 Drams (drs.) make 1 Ounce (oz.)
16 Ounces . . . . 1 Pound (lb.)
14 Pounds . . . . . . 1 Stone (st.)
28 Pounds make 1 Quarter (qr.)
4 Quarters . . . . . . 1 Hundredweight (cwt.)
20 Hundredweights . 1 Ton

N.B. 7000 grains Troy or Apoth. are equivalent to 1 lb. Avoird.

LINEAR MEASURE.

3 Barley-corns make 1 Inch (in.)
4 Inches . . . . 1 Hand
12 Inches . . . . 1 Foot (ft.)
3 Feet . . . . 1 Yard (yd.)
6 Feet . . . . 1 Fathom (fth.)
5½ Yards make 1 Rod, Pole (po.), or Perch
22 Yards (100 Links) 1 Chain
40 Poles (220 Yards) . 1 Furlong (fur.)
8 Furlongs . . . . . . 1 Mile (mi.)
3 Miles . . . . 1 League (lea.)

CLOTH MEASURE.

2¼ Inches make 1 Nail
4 Nails . . . . . . 1 Quarter (qr.)
4 Quarters . . . . 1 Yard (yd.)
3 Quarters make 1 Flemish Ell
5 Quarters . . . . 1 English Ell
6 Quarters . . . . 1 French Ell

SQUARE MEASURE.

144 Square Inches (sq. in.)	make	1 Square Foot (sq. ft.)
9 Square Feet		1 Square Yard (sq. yd.)
30¼ Square Yards		1 Square Rod, Pole, or Perch (sq. po.)
40 Square Poles		1 Rood (ro.)
4 Roods (4840 sq. yds.)		1 Acre (ac.)
640 Acres		1 Square Mile

CUBIC MEASURE.

1728 Cubic Inches (cub. in.)	make	1 Cubic Foot (cub. ft.)
27 Cubic Feet		1 Cubic Yard (cub. yd.)

LIQUID MEASURE.

4 Gills	make	1 Pint (pt.)
2 Pints		1 Quart (qt.)
4 Quarts		1 Gallon (gal.)

Beer Measure.

36 Gallons		1 Barrel
54 Gallons		1 Hogshead
2 Hogsheads		1 Butt
2 Butts		1 Tun

Wine Measure.

63 Gallons	make	1 Hogshead
2 Hogsheads		1 Pipe
2 Pipes		1 Tun

DRY MEASURE.

2 Pints (pts.)	make	1 Quart (qt.)
2 Quarts		1 Pottle (pot.)
2 Pottles		1 Gallon (gal.)
2 Gallons		1 Peck (pk.)
4 Pecks		1 Bushel (bus.)

2 Bushels	make	1 Strike (str.)
2 Strikes		1 Coomb
2 Coombs		1 Quarter (qr.)
5 Quarters		1 Load
2 Loads		1 Last

TIME MEASURE.

60 Seconds (″)	make	1 Minute (′)
60 Minutes		1 Hour (hr.)
24 Hours		1 Day

7 Days	make	1 Week (wk.)
52 Weeks		1 Year (yr.)

In an ordinary year there are 365 days, in Leap-year 366 days.

ERRATA.

Page 7, Ex. 23, *for* 3*d.* *read* $3\frac{3}{4}$*d.*

" 33 " E (4), *for* 21·586 *read* 21·58626.

ELEMENTARY RULES.

EXERCISE I.

NOTATION.

1. EXPRESS in figures the following numbers:

Three hundred and fifty-one; twenty-five thousand, six hundred and seventy-two; two thousand and ten; fifty thousand, six hundred and ten; two million, seven hundred and eighty-nine thousand, one hundred and sixty-seven; two hundred and one thousand, six hundred and ninety-three; three hundred and fifty thousand and seven; two million, nine thousand and fifteen; nine million and one; three hundred and fifty-seven million, eight hundred and seventy-four thousand, two hundred and thirty-one; seven hundred and thirty million, one thousand, five hundred, and sixty-seven; one thousand and seventy-five million, eight hundred and seventy-six thousand, three hundred and twenty-four; two hundred and ten thousand and five million, six hundred and seventy-nine thousand, three hundred and fifty-seven; seven billion, nine hundred and thirteen thousand four hundred and fifty-eight million, nine hundred and thirty-four thousand, eight hundred and ninety-nine.

2. Express in words the following numbers:

297; 35891; 20405; 1009; 356891; 705800; 2067891; 3000020; 5701900; 30002582; 121500307; 300003003; 7580017231; 700070007000; 1200012000012000.

3. Express in Arabic figures the following numbers:

XV; XXIV; XXXIX; LVII; CXIX; CXC; CCXLIX; DCVII; DCCCXCI; MDIX; MMDCXXIII; $\overline{\text{V}}$DLV; $\overline{\text{V}}$XXI; $\overline{\text{VI}}$DL; $\overline{\text{LX}}$LXVI; $\overline{\text{CCXC}}$DXL; $\overline{\text{CCXC}}$DXL; $\overline{\text{M}}$X; $\overline{\text{MMD}}$MC.

4. Express in Roman characters the following numbers: twelve; nineteen; fifty-six; two hundred and eight; five hundred and seventeen; seven hundred and forty; one thousand, one hundred and four; 2689; 15497; 20015; 200150; 651002; 1000001; 2003450.

EXERCISE II.

Reduction.

Reduce

1. £2. 7*s*. 6½*d*. to farthings, and £4. 19*s*. 10½*d*. to halfpence.

2. £12. 9*s*. 6*d*. to sixpences, and £5. 2*s*. 3*d*. to threepences.

3. £6. 10*s*. to half-sovereigns, and £3. 10*s*. to florins.

4. 4 guineas to fourpenny pieces, and 5 guineas, 2*s*. 6*d*. to pence.

5. $\overset{\text{dys.}}{3}\ \overset{\text{hrs.}}{12}\ \overset{\text{min.}}{15}$ to seconds, and $\overset{\text{yrs.}}{2}\ \overset{\text{dys.}}{15}\ \overset{\text{hrs.}}{6}$ to minutes.

6. $\overset{\text{tons}}{4}\ \overset{\text{cwts.}}{11}$ to ounces, and $\overset{\text{tons}}{3}\ \overset{\text{cwts.}}{16}\ \overset{\text{lbs.}}{12}\ \overset{\text{oz.}}{14}$ to drams.

7. $\overset{\text{oz.}}{11}\ \overset{\text{dwts.}}{10}\ \overset{\text{grs.}}{16}$ to grains, and $\overset{\text{lbs.}}{6}\ \overset{\text{dwts.}}{2}$ to pennyweights.

8. $\overset{\text{oz.}}{7}\ \overset{\text{drs.}}{6}\ \overset{\text{scr.}}{2}$ to grains, and $\overset{\text{lbs.}}{3}\ \overset{\text{drs.}}{4}\ \overset{\text{grs.}}{16}$ to grains.

9. $\overset{\text{miles}}{2}\ \overset{\text{fur.}}{3}\ \overset{\text{yds.}}{150}$ to feet, and $\overset{\text{fur.}}{7}\ \overset{\text{yds.}}{115}\ \overset{\text{ft.}}{2}$ to inches.

10. $\overset{\text{sq. yds.}}{3}\ \overset{\text{sq. ft.}}{7}\ \overset{\text{sq. in.}}{60}$ to sq. inches, and $\overset{\text{ac.}}{12}\ \overset{\text{ro.}}{3}\ \overset{\text{po.}}{35}$ to perches.

11. $\overset{\text{cub. yds.}}{12}$ to cubic inches, and $\overset{\text{cub. yds.}}{11}\ \overset{\text{cub. ft.}}{3}\ \overset{\text{cub. in.}}{200}$ to cubic inches.

12. $\overset{\text{bus.}}{3}\ \overset{\text{pks.}}{2}\ \overset{\text{qts.}}{3}$ to pints, and $\overset{\text{loads}}{2}\ \overset{\text{qrs.}}{3}\ \overset{\text{bus.}}{2}\ \overset{\text{gal.}}{1}$ to quarts.

EXERCISE III.

Reduction.

Reduce

1. 1141 farthings to £'s, and 4794 halfpence to £'s.

2. 2580 pence to guineas, and 818 threepenny pieces to £'s.

3. 1685 minutes to days, and 536580 minutes to years.

4. 11092 grains Troy to lbs., and 721 dwts. to lbs.

5. 1880 grains Ap. to ounces, and 4384 grains Ap. to ounces.

6. 10192 lbs. to tons, and 518092 drams to cwts.

7. 9934 feet to miles, and 2165 yards to miles.

8. 4150 poles to acres, and 2478 square inches to square yards.

9. 560872 cubic inches to cubic yards, and 129400 cubic inches to cubic yards.

10. 115 pints to bushels, and 1698 quarts to loads.

EXERCISE IV.

REDUCTION.

1. How many sovereigns are there in 160 half-guineas, and how many half-guineas in 651 crowns?

2. How many fourpenny pieces are there in 100 half-crowns, and how many in 296 threepenny pieces?

3. How many half-guineas are there in 6300 fourpenny pieces, and how many half-crowns in 35 half-guineas?

4. Reduce 40 guineas to sovereigns, and £120. 16*s*. 8*d*. to sixpences.

5. Reduce 27045 guineas to half-crowns, and 4256 sixpences to fourpenny pieces.

6. Express 15 dwts. in drams Ap., and $\overset{\text{lbs.}}{3}\ \overset{\text{oz.}}{7}\ \overset{\text{dwts.}}{15}$ in lbs. Av.

7. Reduce $\overset{\text{qrs.}}{3}\ \overset{\text{lbs.}}{12}$ to Troy weight, and $\overset{\text{lbs.}}{15}\ \overset{\text{oz.}}{2}\ \overset{\text{dwts.}}{5}\ \overset{\text{grs.}}{20}$ to Av. weight.

8. Express 12 lbs. Av. in Troy weight, and $\overset{\text{dwts.}}{16}\ \overset{\text{oz.}}{16}$ in Ap. weight.

9. Reduce 6 scruples to Troy weight, and $\overset{\text{lbs.}}{101}\ \overset{\text{oz.}}{3}$ Troy to Av. weight.

10. Reduce 16 ells to yards, and 1320 fathoms to furlongs.

EXERCISE V.

REDUCTION IN LINEAR AND SQUARE MEASURES.

Reduce

1. $\overset{\text{po.}}{4}\ \overset{\text{yd.}}{1}\ \overset{\text{ft.}}{2}$ to feet, and $\overset{\text{mi.}}{1}\ \overset{\text{fur.}}{3}\ \overset{\text{po.}}{4}\ \overset{\text{yds.}}{2}\ \overset{\text{ft.}}{1}$ to feet.

2. $\overset{\text{po.}}{21}\;\overset{\text{yds.}}{4}\;\overset{\text{ft.}}{2}\;\overset{\text{in.}}{3}$ to inches, and $\overset{\text{mi.}}{2}\;\overset{\text{fur.}}{7}\;\overset{\text{po.}}{15}\;\overset{\text{yd.}}{1}\;\overset{\text{ft.}}{1}\;\overset{\text{in.}}{6}$ to yards.

3. $\overset{\text{sq.po.}}{12}\;\overset{\text{sq.yd.}}{4}\;\overset{\text{sq.ft.}}{5}$ to sq. feet, and $\overset{\text{sq.po.}}{2}\;\overset{\text{sq.yd.}}{15}\;\overset{\text{sq.ft.}}{3}$ to sq. inches.

4. $\overset{\text{ac.}}{3}\;\overset{\text{ro.}}{2}\;\overset{\text{sq.po.}}{14}\;\overset{\text{sq.ft.}}{4}\;\overset{\text{sq.in.}}{72}$ to sq. yards, and $\overset{\text{sq.po.}}{18}\;\overset{\text{sq.yd.}}{4}\;\overset{\text{sq.ft.}}{3}\;\overset{\text{sq.in.}}{72}$ to sq. inches.

5. 860 yards to furlongs, and 14533 yards to leagues.

6. 3082 inches to poles; and 57 feet to poles.

7. 13678 sq. yards to acres; and 3614 sq. yards to roods.

8. 447677 sq. inches to sq. poles; and 170184 sq. feet to acres.

EXERCISE VI.

MISCELLANEOUS EXAMPLES IN ELEMENTARY RULES.

1. Add together 3 tons 10 cwts. 2 qrs. 8 lbs., 2 tons 3 cwts. 3 qrs. 12 lbs., and 4 cwts. 1 qr. 4 lbs.

2. Find the sum of 2 mi. 3 fur. 118 yds., 4 mi. 6 fur. 100 yds. 2 ft., and 10 mi. 7 fur. 200 yds. 1 ft.

3. Three pieces of land consist of 12 ac. 3 ro. 20 po., 15 ac. 2 ro. 30 po., and 25 ac. 1 ro. 30 po. respectively; find how much land there is in the three together.

4. What is the weight of four pieces of gold which weigh respectively 12 dwts. 4 gr., 2 oz. 16 dwts. 10 grs., 3 oz. 10 grs., and 5 oz. 11 dwts.?

5. Subtract 3 bus. 2 pks. 3 qts. from 4 bus. 1 pk. 1 qt.

6. What is the difference between 7 oz. 6 drs. 2 sc. and 3 lbs. 4 drs. 16 grs.?

7. One of two men is 76 years and 40 weeks old, the other is 50 years, 50 weeks and 4 days; how much is one older than the other?

8. I have to pay the following debts; to *A*, £12. 6*s*. 4½*d*., to *B*, £13. 5*s*. 6¾*d*., to *C*, £24. 4*s*. 8¼*d*., to *D*, £32. 6*s*. 8*d*. What shall I have left out of a hundred pound bank-note?

9. Twenty-nine parcels of money each contain £2. 5*s*. 3¼*d*.; what is the sum contained in them all together?

10. Find the whole length of 36 pieces of cable, each of which is 8 lea. 2 mi. 1125 yds. in length.

11. How many yards of cloth are there in 27 bales, each containing 15 pieces, and each piece 15 yards?

12. Find the value of 125 lbs. of silver at £2. 18*s*. 9*d*. per lb.

13. Find the weight of 37 silver ornaments, each containing on the average 12 lbs. 2 oz. 15 dwts. 6 grs.

14. What sum of money must I have, that I may give 324 persons £17. 9*s*. 10½*d*. each?

15. What sum must I have that I may give 596 persons £24. 10*s*. 9½*d*. each?

16. Divide £145. 7*s*. 2¼*d*. equally among 45 men.

17. Divide 1114 tons 15 cwts. 3 qrs. 7 lbs. into 63 equal shares.

18. Thirty-two poor persons have distributed equally among them 2 cwts. 1 qr. 10 lbs. 14 oz.; what share will each receive?

19. Find the value of five million dollars, worth 4*s*. 6*d*. each.

20. What is the whole weight of 217 waggon loads, each containing 3 tons 13 cwts. 3 qrs. 13 lbs.?

21. What number subtracted from 670194 will leave 3825?

The product of two numbers is 36865365, and one of them is 365; what is the other?

22. How many times is a weight of 6 tons 7 cwts. 27 lbs. 5 oz. contained in 159 tons 1 cwt. 10 lbs. 13 oz.?

23. How many articles which cost £2. 10*s.* 3*d.* each can be bought for £40. 5*s.*?

24. 797 tons 19 cwts. 2 qrs. 14 lbs. is divided among a certain number of people, so that each receives 5 tons 3 cwts. 2 qrs. 15 lbs. How many of them are there?

25. Divide 794 wks. 7 hrs. 45 min. into 271 equal portions of time.

26. Find the product of 375695 and 32049.

27. Find the product of the sum and difference of 119 and 17, and find the quotient of the answer by 48.

28. If the divisor of a sum is 8765, and the quotient is 456, and the remainder 0, find the dividend.

29. £657. 9*s.* 9½*d.* is divided among 68 persons, so that one receives four times as much as each of the others; find their shares.

30. Find the cost of 20 dozen of wine at 4*s.* 11½*d.* a bottle; and if 3 bottles be spoiled, what will the merchant gain by selling the remainder at 5*s.* 4*d.* a bottle?

EXERCISE VII.

GREATEST COMMON MEASURE.

Find the G.C.M. of the following numbers:

1. 556 and 973.
2. 189 and 1080.
3. 2373 and 6667.
4. 780 and 4095.
5. 1661 and 6191.
6. 1233 and 19180.
7. 150443 and 640987.
8. 10907 and 7241.
9. 3852 and 762896.
10. 2192 and 458.
11. 255, 340, and 408.
12. 240, 648, and 420.
13. 174, 580, and 443.
14. 24990, 30030, and 36225
15. 3168, 1595, and 2530.
16. 870, 1160, and 1479.
17. 380, 399, and 589.
18. 186, 279, and 496.
19. 900, 216, and 360.
20. 1435, 1085, and 2135.

EXERCISE VIII.

LEAST COMMON MULTIPLE.

Find the L. C. M. of the following numbers:

1. 7, 8, 15, 21, and 24.
2. 8, 9, 16, 24, and 27.
3. 4, 7, 12, 21, and 34.
4. 12, 16, 21, 35, 42, and 60.
5. 12, 14, 20, 24, and 30.
6. 15, 27, 36, 54, 60, and 80.
7. 6, 9, 15, 25, 36, 40, and 54.
8. 8, 12, 18, 24, 28, and 30.

9. 10, 15, 18, 24, 28, and 40.
10. 16, 14, 12, 32, 50, and 75.
11. 14, 21, 24, 36, 49, and 60.
12. 15, 18, 24, 40, 50, and 90.
13. 16, 14, 20, 24, 32, and 35.
14. 5, 6, 7, 8, 9, 10, 11, and 12.
15. 8, 20, 34, 50, 56, 70, and 85.
16. 508 and 889.
17. 517 and 564.
18. 124, 341, and 372.
19. 312, 260, and 390.
20. 1595, 2530, and 3168.

EXERCISE IX.

Vulgar Fractions.

Reduce to their lowest terms:

1. $\frac{35}{135}$. 2. $\frac{80}{96}$. 3. $\frac{333}{396}$. 4. $\frac{875}{1008}$.

5. $\frac{132}{180}$. 6. $\frac{138}{150}$. 7. $\frac{39}{243}$. 8. $\frac{96}{144}$.

9. $\frac{504}{616}$. 10. $\frac{805}{875}$. 11. $\frac{1872}{2016}$. 12. $\frac{3069}{3168}$.

13. $\frac{363}{605}$. 14. $\frac{1089}{1573}$. 15. $\frac{350}{1015}$. 16. $\frac{1309}{1785}$.

17. $\frac{504}{616}$. 18. $\frac{5184}{6912}$. 19. $\frac{3168}{5148}$. 20. $\frac{1050}{1386}$.

21. $\frac{1485}{4941}$. 22. $\frac{1428}{1596}$. 23. $\frac{2268}{3444}$.

24. $\frac{924}{1188}$. 25. $\frac{1485}{3267}$.

EXERCISE X.

Reduce to their lowest terms (by G. C. M.):

1. $\frac{406}{1595}$. 2. $\frac{591}{788}$. 3. $\frac{471}{785}$. 4. $\frac{1599}{2665}$.

5. $\frac{814}{1221}$. 6. $\frac{622}{1555}$. 7. $\frac{4234}{6351}$. 8. $\frac{322}{1127}$.

9. $\frac{2253}{3004}$. 10. $\frac{508}{889}$. 11. $\frac{609}{1421}$. 12. $\frac{492}{1107}$.

13. $\frac{518}{1221}$. 14. $\frac{2418}{2697}$. 15. $\frac{2109}{2697}$. 16. $\frac{9050}{17919}$.

17. $\frac{243936}{313632}$. 18. $\frac{45045}{58905}$. 19. $\frac{13755}{16506}$. 20. $\frac{217800}{245025}$.

EXERCISE XI.

Reduce to whole or mixed numbers:

1. $\frac{31}{10}$. 2. $\frac{28}{3}$. 3. $\frac{45}{6}$. 4. $\frac{21}{8}$.

5. $\frac{39}{5}$. 6. $\frac{24}{11}$. 7. $\frac{19}{7}$. 8. $\frac{36}{9}$.

9. $\frac{42}{14}$. 10. $\frac{33}{13}$. 11. $\frac{100}{27}$. 12. $\frac{99}{23}$.

13. $\frac{81}{16}$. 14. $\frac{775}{31}$. 15. $\frac{513}{133}$. 16. $\frac{256}{64}$.

17. $\frac{664}{29}$. 18. $\frac{455}{76}$. 19. $\frac{1261}{356}$. 20. $\frac{2565}{694}$.

EXERCISE XII.

Reduce to improper fractions:

1. $15\frac{7}{10}$. 2. $9\frac{3}{5}$. 3. $192\frac{1}{5}$. 4. $25\frac{3}{11}$.
5. $12\frac{7}{12}$. 6. $4\frac{2}{13}$. 7. $8\frac{5}{16}$. 8. $6\frac{9}{19}$.
9. $2\frac{4}{17}$. 10. $27\frac{2}{13}$. 11. $15\frac{3}{17}$. 12. $15\frac{6}{11}$.
13. $3\frac{2}{125}$. 14. $44\frac{9}{59}$. 15. $31\frac{9}{25}$. 16. $22\frac{7}{16}$.
17. $100\frac{7}{10}$. 18. $1000\frac{7}{1000}$. 19. $102\frac{9}{100}$. 20. $1001\frac{11}{101}$.

EXERCISE XIII

1. Express 7 with denominators 2, 5, and 9.

2. Express 12 and 13 with denominators 4, 5, and 12.

3. Express 17 with denominators 9, 17, and 21; and 14 with denominators 14, 8, and 26.

4. Express 13 and 7 with denominators 13 and 7· and 12 and 19 with denominators 1, 3, and 7.

5. Express $\frac{5}{6}$ with denominators 42, 66, and 90.

6. Express $\frac{4}{13}$ with denominators 26, 169, and 429.

7. Express $\frac{30}{90}$ with denominators 9, 15, and 18.

8. Express $\frac{984}{1200}$ with denominators 600, 300, 400, and 50.

9. Express 9, $\frac{2}{3}$, and $\frac{5}{30}$, each with denominator 6.

10. What fractions with denominator 8 are equivalent to $\frac{72}{96}$ $\frac{3}{4}$, and 1 respectively?

EXERCISE XIV.

Multiply

1. $\frac{2}{43}$ by 8, 12, 15, and 20.
2. $\frac{3}{37}$ by 2, 5, 7, and 12.
3. $\frac{8}{81}$ by 3, 4, 6, and 9.
4. $\frac{3}{64}$ by 4, 10, 13, and 18.
5. $\frac{7}{9}$ by 2, 3, 6, and 9.
6. $\frac{19}{24}$ by 6, 8, 13, and 20.
7. £7. 9*s*. $1\frac{2}{5}$*d*. by 10.
8. £3. 12*s*. $7\frac{1}{5}$*d*. by 8.
9. £4. 19*s*. $10\frac{1}{5}$*d*. by 12.
10. £6. 8*s*. $9\frac{3}{10}$*d*. by 25.
11. £12. 1*s*. $2\frac{3}{8}$*d*. by 21.
12. £31. 13*s*. $6\frac{54}{73}$*d*. by 63.
13. £2. 9*s*. $10\frac{1}{3}$*d*. by 48.
14. £18. 13*s*. $9\frac{5}{12}$*d*. by 25.
15. £11. 9*s*. $1\frac{7}{9}$*d*. by 31.
16. £15. 6*s*. $4\frac{2}{5}$*d*. by 31.
17. £2. 8*s*. $9\frac{1}{3}$*d*. by 23.
18. £2. 8*s*. $9\frac{2}{5}$*d*. by 123.
19. £5. 7*s*. $9\frac{3}{8}$*d*. by 37.
20. £14. 19*s*. $11\frac{2}{7}$*d*. by 133.

EXERCISE XV.

Divide

1. $\frac{5}{6}$ by 2, 3, 8, and 12.
2. $\frac{16}{19}$ by 2, 4, 8, and 16.
3. $\frac{28}{29}$ by 2, 3, 7, and 11.
4. $\frac{18}{25}$ by 5, 6, 8, and 12.
5. $14\frac{7}{8}$ by 2, 7, 14, and 21.
6. $12\frac{4}{5}$ by 2, 6, 12, and 16.
7. $15\frac{3}{10}$ by 3, 5, 7, and 19.
8. $2\frac{1}{3}$ by 7, 18, 28, and 43.
9. £27. 2*s*. 3*d*. by 5.
10. £10. 9*s*. $10\frac{1}{3}$*d*. by 5.
11. £17. 8*s*. $2\frac{2}{5}$*d*. by 11.
12. £16. 5*s*. $9\frac{1}{5}$*d*. by 16.
13. £5. 7*s*. $9\frac{3}{8}$*d*. by 36.
14. £319. 4*s*. $7\frac{1}{4}$*d*. by 42.

15. £360. 8*s*. $6\frac{1}{4}$*d*. by 21. 16. £12. 5*s*. $10\frac{3}{7}$*d*. by 14.

17. £205. 11*s*. $4\frac{1}{2}$*d*. by 125. 18. £210. 4*s*. $7\frac{1}{5}$*d*. by 132.

19. £2312. 9*s*. $10\frac{1}{7}$*d*. by 73. 20. £210. 17*s*. $6\frac{15}{32}$*d*. by 101.

EXERCISE XVI.

A. Find the value of

(1) $\frac{1}{5}\times\frac{15}{19}$. (2) $\frac{2}{3}\times 4\frac{1}{2}$. (3) $2\frac{1}{5}\times\frac{3}{11}\times\frac{2}{7}$.

(4) $4\frac{1}{8}\times 3\frac{7}{11}\times\frac{2}{5}$. (5) $\frac{5}{9}$ of $\frac{12}{25}$ of $1\frac{1}{5}$.

(6) $3\frac{2}{3}\times 5\frac{1}{9}$ of $\frac{27}{46}$. (7) $\frac{12}{23}$ of $9\frac{1}{5}\times\frac{25}{48}$ of 8.

(8) $2\frac{1}{9}\times\frac{3}{7}\times\frac{5}{38}\times 2\frac{1}{3}$. (9) $2\frac{2}{3}$ of $\frac{3}{5}$ of $7\frac{1}{2}\times\frac{3}{25}$.

(10) $2\frac{1}{2}$ of $\frac{7}{9}$ of $2\frac{1}{4}$ of $\frac{13}{21}$. (11) $3\frac{1}{3}\times 7\frac{1}{2}\times\frac{9}{40}$ of $\frac{8}{25}$.

(12) $\frac{3}{5}\times 2\frac{2}{3}\times 7\frac{1}{2}\times\frac{3}{25}$. (13) $2\frac{1}{3}$ of $3\frac{1}{9}$ of $4\frac{1}{7}$ of $1\frac{1}{29}$.

(14) $\frac{1}{2}$ of $\frac{7}{9}$ of $\frac{3}{14}$ of $7\frac{1}{5}$. (15) $3\frac{1}{8}$ of $\frac{2}{17}\times 6\frac{4}{5}$ of $\frac{10}{11}$.

(16) $3\frac{1}{3}$ of $7\frac{1}{2}$ of $\frac{9}{40}$ of $\frac{3}{25}$. (17) $\frac{3}{17}$ of $2\frac{1}{9}$ of $1\frac{15}{19}$ of 21.

(18) $5\frac{1}{2}$ of $\frac{7}{22}$ of $1\frac{1}{14}$ of $3\frac{1}{5}$. (19) $2\frac{2}{9}$ of $5\frac{2}{5}$ of $7\frac{1}{8}$ of $1\frac{5}{19}$ of $\frac{1}{7}$.

(20) $2\frac{1}{8}\times\frac{16}{35}\times 7\frac{7}{12}\times 11\frac{1}{3}\times\frac{2}{17}$.

B. Multiply

(1) $3\frac{1}{9}$ by $\frac{5}{14}$. (2) $2\frac{1}{8}$ by $\frac{50}{51}$. (3) $3\frac{1}{3}$ of $\frac{7}{15}$ by $2\frac{1}{7}$ of $\frac{5}{9}$.

(4) $3\frac{2}{3}$ of $\frac{51}{70}$ by $6\frac{2}{3}$ of $\frac{21}{25}$. (5) $\frac{1}{5}$ of $2\frac{1}{6}$ by $4\frac{1}{2}$ of $\frac{5}{19}$.

(6) $\frac{2}{5}$ of $2\frac{1}{7}$ of $7\frac{1}{2}$ by $4\frac{1}{5}$ of $\frac{8}{9}$.

(7) $2\frac{1}{2}$ of $\frac{7}{9}$ by $\frac{4}{5}$ of $3\frac{3}{8}$ of $5\frac{1}{3}$.

(8) $\frac{1}{7}$ of $\frac{2}{9}$ of $7\frac{1}{5}$ by $5\frac{1}{4}$ of $6\frac{1}{3}$.

(9) $5\frac{1}{3}$ by $\frac{20}{23}$ of $7\frac{1}{5}$ of $\frac{15}{29}$ of $7\frac{1}{4}$.

(10) $3\frac{1}{8}$ of $\frac{4}{9}$ of $\frac{3}{16}$ by $2\frac{1}{5}$ of $\frac{7}{12}$ of $\frac{6}{11}$.

EXERCISE XVII.

A. Divide

(1) $\frac{2}{9}$ by $\frac{3}{5}$. (2) $3\frac{2}{3}$ by $3\frac{3}{4}$. (3) $\frac{7}{12}$ by $\frac{3}{4}$.

(4) $2\frac{1}{3}$ by $5\frac{1}{3}$. (5) $7\frac{2}{5}$ by $6\frac{1}{3}$. (6) $\frac{48}{63}$ by $\frac{1}{21}$.

(7) $3\frac{1}{8}$ by 15. (8) $5\frac{2}{3}$ by $4\frac{1}{3}$. (9) $\frac{1}{2}$ of $\frac{3}{5}$ by $\frac{9}{10}$.

(10) $1\frac{7}{8}$ of $7\frac{1}{5}$ by $2\frac{4}{9}$. (11) $2\frac{1}{5}$ of $1\frac{3}{4}$ by $2\frac{1}{3}$.

(12) $1\frac{4}{5}$ by $\frac{3}{25}$ of $\frac{7}{8}$. (13) $\frac{3}{5}$ of $2\frac{1}{2}$ by $\frac{12}{19}$ of $6\frac{1}{3}$.

(14) $\frac{2}{3}$ of $4\frac{1}{2}$ by $\frac{7}{9}$ of $3\frac{3}{5}$.

B. Find the value of

(1) $1\frac{2}{7} \div \frac{3}{4}$. (2) $2\frac{5}{8} \div 4\frac{2}{3}$. (3) $3\frac{7}{8}$ of $1\frac{2}{3}$ of $1\frac{4}{31}$ of $\frac{3}{20} \div 1\frac{2}{5}$.

(4) $\frac{2\frac{1}{2}}{1\frac{2}{5}}$. (5) $\frac{8\frac{1}{3}}{12\frac{2}{9}}$. (6) $\frac{4\frac{1}{5}}{\frac{1}{10}}$. (7) $\frac{2\frac{5}{8}}{7}$.

(8) $\frac{9}{6\frac{3}{5}}$. (9) $\frac{4\frac{1}{2} \text{ of } 7\frac{1}{3}}{2\frac{1}{5}}$. (10) $\frac{2\frac{2}{3} \text{ of } 1\frac{1}{4}}{5\frac{1}{3} \text{ of } 3\frac{3}{4}}$.

(11) $\frac{1\frac{1}{3} \text{ of } \frac{4}{13}}{1\frac{2}{7}}$. (12) $\frac{2\frac{1}{5} \text{ of } 2\frac{1}{2}}{\frac{3}{14} \text{ of } 3\frac{2}{3}}$. (13) $\frac{1\frac{1}{2}}{1\frac{1}{5} \text{ of } \frac{5}{21} \text{ of } \frac{3}{20}}$.

(14) $\frac{3\frac{2}{3} \text{ of } 5\frac{1}{4} \text{ of } 7\frac{1}{2}}{63}$. (15) $3\frac{2}{5} \times \frac{7\frac{1}{7} \text{ of } 1\frac{2}{5}}{3\frac{1}{5}}$.

(16) $7\frac{1}{5} \text{ of } \frac{3\frac{1}{3}}{1\frac{1}{10} \times 1\frac{5}{7}}$. (17) $\frac{9}{\frac{2}{11} \text{ of } 1\frac{5}{17} \times 4\frac{4}{5}}$.

(18) $\frac{16}{\frac{7}{15} \text{ of } 2\frac{8}{11} \times \frac{11}{35}}$. (19) $\frac{\frac{13}{27}}{1\frac{2}{9} \text{ of } 3\frac{9}{10}} \times \frac{1}{\frac{5}{11}}$.

(20) $\frac{1}{3\frac{1}{2}} \div \frac{\frac{4}{17} \times \frac{3}{14}}{\frac{1}{8}}$. (21) $\frac{6\frac{2}{3}}{4\frac{1}{4}} \div \frac{1\frac{1}{3} \text{ of } \frac{8}{45}}{\frac{1}{9} \text{ of } 2\frac{1}{5}}$.

EXERCISE XVIII.

A. Reduce to their Least Common Denominator:

(1) $\frac{2}{5}, \frac{3}{8}, \frac{5}{16}$. (2) $\frac{7}{9}, \frac{11}{15}, \frac{11}{12}$.

(3) $\frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{7}{8}$. (4) $\frac{3}{5}, \frac{2}{9}, \frac{2}{3}, \frac{7}{15}$.

(5) $\frac{7}{25}, \frac{11}{30}, \frac{8}{15}, \frac{3}{50}$. (6) $\frac{2}{27}, \frac{3}{54}\ \frac{7}{9}, \frac{3}{20}$.

(7) $\frac{2}{15}, \frac{5}{16}, \frac{7}{18}, \frac{11}{20}.$ (8) $\frac{2}{9}, \frac{5}{16}, \frac{11}{24}, \frac{5}{27}.$

(9) $\frac{5}{32}, \frac{3}{28}, \frac{1}{14}, \frac{13}{42}.$ (10) $\frac{1}{3}, \frac{2}{5}, \frac{3}{10}, \frac{5}{6}, \frac{19}{30}.$

(11) $\frac{7}{9}, \frac{5}{12}, \frac{3}{4}, \frac{9}{10}, \frac{7}{18}.$ (12) $\frac{1}{3}, \frac{5}{9}, \frac{4}{7}, \frac{3}{14}, \frac{5}{6}.$

(13) $\frac{4}{5}, \frac{2}{9}, \frac{7}{12}, \frac{14}{15}, \frac{5}{27}.$ (14) $\frac{9}{22}, \frac{4}{121}, \frac{7}{33}, \frac{1}{11}, \frac{5}{242}.$

(15) $\frac{8}{9}, \frac{5}{18}, \frac{4}{27}, \frac{2}{3}, \frac{7}{12}.$

B. Which is the greatest and which the least of the following sets of fractions?

(1) $\frac{2}{3}, \frac{4}{9}, \frac{3}{5}.$ (2) $\frac{5}{11}, \frac{9}{22}, \frac{16}{33}.$

(3) $\frac{4}{5}, \frac{9}{10}, \frac{17}{20}, \frac{21}{25}.$ (4) $\frac{7}{9}, \frac{4}{5}, \frac{8}{15}, \frac{17}{20}.$

(5) $\frac{7}{10}, \frac{11}{15}, \frac{17}{25}, \frac{27}{40}.$ (6) $\frac{11}{30}, \frac{17}{40}, \frac{19}{45}, \frac{23}{50}.$

C. Arrange in order of magnitude:

(1) $\frac{3}{7}, \frac{4}{9}, \frac{10}{21}, \frac{23}{42}.$ (2) $\frac{3}{16}, \frac{1}{6}, \frac{2}{9}, \frac{7}{32}.$

(3) $\frac{5}{12}, \frac{1}{2}, \frac{4}{9}, \frac{19}{36}.$ (4) $\frac{4}{11}, \frac{9}{25}, \frac{18}{55}, \frac{9}{22}.$

(5) $\frac{7}{15}, \frac{1}{2}, \frac{11}{18}, \frac{11}{20}.$ (6) $\frac{3}{7}, \frac{2}{5}, \frac{7}{15}, \frac{13}{25}.$

(7) $\frac{2}{3}$ of $\frac{9}{16}$, $\frac{1}{15}$ of $5\frac{1}{4}$, $\frac{1}{4}$ of $1\frac{4}{5}$.

(8) $1\frac{1}{7}$ of $\frac{1}{4}$, $\frac{5}{21}$ of $3\frac{1}{2}$, $\frac{1}{3}$ of $2\frac{5}{8}$.

(9) $\frac{5}{8}$ of $2\frac{2}{7}$, $1\frac{2}{5}$, $3\frac{1}{2}$ of $\frac{5}{14}$ of $\frac{8}{9}$.

EXERCISE XIX.

A. Find the value of

(1) $\frac{1}{6}+\frac{1}{8}+\frac{1}{12}+\frac{1}{18}$. (2) $\frac{5}{11}+\frac{17}{22}+\frac{3}{8}$.

(3) $\frac{2}{9}+\frac{5}{12}+\frac{7}{15}$. (4) $\frac{3}{4}+\frac{5}{6}+\frac{7}{8}+\frac{9}{10}$.

(5) $\frac{3}{7}+\frac{9}{16}+\frac{15}{28}$. (6) $\frac{1}{5}+\frac{3}{10}+\frac{7}{18}+2+8\frac{5}{6}$.

(7) $2\frac{1}{3}+3\frac{4}{7}+\frac{5}{12}+7\frac{11}{16}$. (8) $2\frac{1}{3}+4\frac{4}{5}+7\frac{1}{12}+8\frac{5}{18}$.

(9) $\frac{1}{3}+2\frac{2}{5}+7\frac{1}{9}+4\frac{5}{12}$. (10) $4\frac{1}{9}+7\frac{1}{5}+2\frac{1}{3}+3\frac{7}{20}$.

(11) $1\frac{1}{2}+1\frac{1}{3}+4\frac{1}{5}+6\frac{2}{3}$. (12) $7\frac{5}{9}+10\frac{4}{15}+4\frac{1}{3}+7\frac{7}{30}$.

(13) $1\frac{1}{8}+3\frac{1}{3}+2\frac{3}{4}+5\frac{5}{12}$. (14) $4\frac{1}{3}+5\frac{1}{4}+3\frac{1}{5}+7\frac{1}{12}+9\frac{1}{15}$.

(15) $\frac{13}{27}+3\frac{1}{9}+4\frac{2}{5}+1\frac{7}{15}+\frac{73}{135}$.

B. Add together

(1) $2\frac{5}{7}$, $3\frac{1}{3}$, and $4\frac{9}{14}$ (2) $\frac{4}{7}$, $3\frac{13}{21}$, $5\frac{17}{28}$, and $1\frac{1}{2}$.

(3) $8\frac{1}{3}$, $3\frac{1}{5}$, $7\frac{1}{2}$, and $2\frac{7}{10}$. (4) $3\frac{5}{9}$, $6\frac{5}{6}$, $8\frac{1}{3}$, and $10\frac{7}{15}$.

(5) $3\frac{1}{3}$, $2\frac{3}{10}$, $5\frac{11}{15}$, and $6\frac{7}{20}$. (6) $3\frac{2}{3}$, $1\frac{3}{4}$, $4\frac{2}{5}$ and $\frac{1}{15}$.

(7) $13\frac{1}{9}$, $5\frac{3}{10}$, 4, $1\frac{17}{45}$, and $\frac{13}{60}$. (8) $1\frac{5}{19}$, $2\frac{6}{7}$, $\frac{11}{38}$ and $6\frac{1}{14}$.

C. Find the sum of

	£.	s.	d.		£.	s.	d.		£.	s.	d.
(1)	18	5	$6\frac{2}{3}$	(2)	2	7	$9\frac{3}{8}$	(3)	3	5	$6\frac{1}{4}$
	20	4	$10\frac{5}{6}$		4	2	$11\frac{3}{4}$		2	15	$10\frac{1}{3}$
	11	9	$7\frac{1}{3}$		5	9	$3\frac{1}{6}$		7	9	$6\frac{2}{5}$
									10	11	$4\frac{7}{10}$

	£.	s.	d.
(4)	3	17	$8\frac{1}{3}$
	7	19	$11\frac{2}{5}$
	8	13	$4\frac{7}{8}$
	13	0	$2\frac{5}{12}$
	17	18	$9\frac{7}{20}$

	cwts.	qrs.	lbs.
(5)	20	2	$4\frac{1}{9}$
	18	3	$18\frac{5}{12}$
	7	0	$2\frac{3}{4}$

	wks.	d.	hrs.
(6)	5	2	$6\frac{1}{7}$
	4	3	$10\frac{3}{14}$
	7	6	$20\frac{1}{3}$
	10	4	$0\frac{11}{21}$

	ac.	ro.	po.
(7)	7	2	$11\frac{17}{20}$
	4	1	$12\frac{11}{15}$
	7	3	$30\frac{17}{30}$

	bus.	pk.	gal.	qts.
(8)	3	2	1	$3\frac{3}{8}$
	1	0	1	$2\frac{5}{6}$
	2	1	1	$1\frac{7}{12}$

D. Find the value of

(1) $5\frac{1}{4}$ of $\frac{11}{21}+4\frac{3}{8}+7\frac{5}{6}$.　　(2) $3\frac{1}{4}+7\frac{2}{3}+7\frac{1}{4}$ of $3\frac{2}{5}$.

(3) $2\frac{1}{3}+4\frac{3}{4}$ of $1\frac{1}{19}+2\frac{1}{5}$ of $\frac{3}{11}$.

(4) $\frac{3}{5}+2\frac{1}{2}$ of $\frac{7}{25}+3\frac{1}{3}$ of $\frac{9}{20}$.

(5) $7\frac{1}{3}+2\frac{1}{5}$ of $\frac{10}{33}+5\frac{1}{7}$ of $4\frac{2}{3}$ of $2\frac{1}{4}$.

(6) $3\frac{1}{2}+2\frac{1}{7}$ of $4\frac{1}{5}+5\frac{1}{9}$ of $\frac{3}{23}$.

(7) $\frac{16}{21}+3\frac{1}{2}$ of $\frac{11}{14}$ of $\frac{7}{10}$ of $\frac{8}{9}+\frac{3}{7}$.

(8) $3\frac{2}{5}+4\frac{1}{3}$ of $\frac{12}{13}+5\frac{1}{2}$ of $\frac{15}{22}$ of $\frac{4}{5}$.

(9) $3\frac{1}{14}+5\frac{5}{6}+2\frac{1}{15}+2\frac{2}{3}$ of $\frac{5}{28}$.

(10) $6\frac{2}{7}$ of $\frac{5}{11}+\frac{2}{9}+8\frac{1}{3}$ of $\frac{7}{15}$.

(11) $3\frac{1}{8}+5\frac{6}{7}+2\frac{4}{5}$ of $\frac{5}{21}$ of $5\frac{3}{5}$.　　(12) $\frac{2\frac{1}{2}\text{ of }13\frac{1}{2}}{2\frac{1}{4}}+7\frac{1}{3}$ of $\frac{17}{33}$.

(13) $8\frac{1}{2}+\frac{9\frac{1}{2}}{7\frac{3}{5}}+\frac{2\frac{1}{5}}{1\frac{7}{15}}+\frac{7}{8}$. (14) $7\frac{3}{5}+2\frac{1}{7}$ of $5\frac{1}{4}$ of $\frac{1}{5}+\frac{3}{7}$ of $5\frac{1}{4}$.

(15) $\frac{3\frac{3}{8} \text{ of } 5\frac{1}{3}}{4\frac{1}{2}}+4\frac{1}{2}$ of $\frac{6}{7}$ of $1\frac{5}{9}$.

(16) $3\frac{2}{5}+4\frac{3}{4}$ of $1\frac{1}{2}$ of $\frac{16}{19}+\frac{2\frac{2}{5}}{\frac{2}{5}}$.

(17) $\frac{7\frac{1}{3}}{1\frac{4}{7}}+\frac{2\frac{5}{8} \text{ of } 5\frac{1}{3}}{2\frac{1}{3}}+1\frac{1}{2}$. (18) $1\frac{1}{3}+2\frac{2}{3}$ of $1\frac{7}{34}+\frac{4}{5\frac{1}{10}}$.

(19) $3\frac{1}{17}$ of $\frac{1\frac{4}{13}}{1\frac{1}{2}}+\frac{7}{9}+13\frac{1}{2}$ of $\frac{17}{18}$ of $\frac{7\frac{2}{5}}{3\frac{4}{5}}$.

(20) $2\frac{1}{5}+3\frac{2}{5}$ of $\frac{2\frac{1}{2}}{1\frac{2}{15}}+\frac{7}{10}+6\frac{1}{4}$ of $\frac{2}{1\frac{1}{4}}$.

EXERCISE XX.

A. Find the value of

(1) $\frac{17}{20}-\frac{4}{5}$. (2) $\frac{23}{24}-\frac{43}{48}$. (3) $\frac{2}{9}-\frac{1}{7}$.

(4) $\frac{3}{5}-\frac{1}{3}$. (5) $\frac{1}{2}-\frac{1}{5}$. (6) $\frac{2}{7}-\frac{4}{15}$.

(7) $8\frac{1}{2}-\frac{4}{9}$. (8) $4\frac{2}{5}-2\frac{1}{3}$. (9) $2\frac{1}{5}-1\frac{1}{10}$.

(10) $3\frac{7}{15}-1\frac{2}{9}$. (11) $5\frac{7}{25}-2\frac{7}{35}$. (12) $8\frac{3}{10}-7\frac{13}{100}$.

(13) $2\frac{5}{6}-1\frac{7}{12}$. (14) $7-\frac{2}{5}$. (15) $3\frac{3}{7}-1\frac{4}{5}$.

(16) $3\frac{5}{12}-1\frac{5}{6}$. (17) $8\frac{3}{7}-5\frac{4}{9}$. (18) $6\frac{1}{2}-2\frac{11}{12}$.

(19) $6\frac{1}{3}-4\frac{8}{9}$. (20) $5\frac{3}{14}-2\frac{20}{21}$.

B. Find the difference between

(1) $\frac{6}{25}$ and $\frac{2}{15}$. (2) $3\frac{1}{10}$ and $1\frac{4}{7}$.

(3) $3\frac{1}{9}$ and $2\frac{1}{3}$. (4) $4\frac{5}{7}$ and $2\frac{4}{5}$.

(5) $1\frac{1}{5}$ and $\frac{7}{10}$. (6) $7\frac{5}{12}$ and $3\frac{11}{20}$.

(7) $7\frac{1}{3}$ and $6\frac{5}{6}$.

(8) $2\frac{1}{3}$ and $1\frac{1}{4}$.

(9) $2\frac{1}{7}$ and $1\frac{2}{3}$.

(10) $2\frac{1}{9}$ and $1\frac{2}{7}$.

(11) $3\frac{1}{5}$ and $\frac{1}{3}$ of $1\frac{1}{5}$.

(12) $2\frac{7}{8}$ and $1\frac{1}{2}$ of $\frac{6}{7}$.

(13) $\frac{3}{7}$ of $4\frac{2}{3}$ and $\frac{2}{9}$ of $5\frac{2}{3}$.

(14) $\frac{19}{30}$ of $6\frac{2}{3}$ and $\frac{17}{20}$ of $\frac{15}{16}$.

(15) $2\frac{1}{9}$ of $\frac{16}{57}$ and $1\frac{3}{7}$ of $5\frac{3}{8}$.

(16) $\frac{2}{5}+\frac{8}{9}+\frac{23}{30}$ and $\frac{4}{15}+\frac{1}{3}$.

(17) $\frac{5}{24}+\frac{1}{6}+\frac{7}{16}+\frac{7}{8}$ and $\frac{3}{8}$.

(18) $2\frac{1}{2}+5\frac{1}{9}$ of $1\frac{4}{23}$ and $3\frac{1}{8}$ of $\frac{4}{15}$.

C. (1)
£. s. d.
From 28 . 9 . $1\frac{5}{6}$
take 15 . 4 . $5\frac{2}{3}$

(2)
£. s. d.
From 12 . 8 . $9\frac{1}{4}$
take 7 . 19 . $10\frac{1}{3}$

(3)
£. s. d.
From 20 . 7 . $5\frac{1}{3}$
take 12 . 8 . $10\frac{1}{2}$

(4)
£. s. d.
From 8 . 10 . $6\frac{1}{5}$
take 7 . 9 . $7\frac{1}{3}$

(5)
£. s. d.
From 12 . 7 . $8\frac{2}{3}$
take 9 . 14 . $10\frac{5}{7}$

(6)
£. s. d.
From 18 . 13 . $7\frac{4}{9}$
take 13 . 18 . $9\frac{4}{7}$

(7)
£. s. d.
From 11 . 8 . $4\frac{2}{9}$
take 7 . 6 . $8\frac{7}{11}$

(8)
£. s. d.
From 8 . 9 . $10\frac{1}{4}$
take 5 . 15 . $11\frac{3}{5}$

(9)
lbs. oz. drs.
From 13 . 9 . $7\frac{3}{4}$
take 7 . 8 . $7\frac{5}{8}$

(10)
tons cwts. lbs.
From 3 . 15 . $77\frac{2}{5}$
take 1 . 17 . $95\frac{8}{11}$

(11)
cwts. qrs. lbs.
From 2 . 3 . $15\frac{7}{9}$
take 1 . 3 . $17\frac{17}{18}$

(12)
cwts. qrs. lbs. oz.
From 3 . 3 . 3 . $3\frac{1}{3}$
take 2 . 2 . 2 . $2\frac{1}{2}$

EXERCISE XXI.

A. Reduce to their simplest form:

(1) $\frac{1}{3}-\frac{1}{4}-\frac{1}{6}+\frac{1}{5}$. (2) $\frac{1}{9}+\frac{2}{3}-\frac{5}{6}+\frac{2}{5}-\frac{1}{3}$.

(3) $\frac{1}{9}+\frac{5}{12}-\frac{4}{15}-\frac{7}{30}+\frac{13}{20}$. (4) $\frac{2}{5}+\frac{5}{9}-\frac{5}{6}+\frac{3}{4}-\frac{7}{18}$.

(5) $8\frac{1}{5}+4\frac{1}{9}-7\frac{2}{3}-3\frac{5}{6}+2\frac{11}{15}$. (6) $3\frac{1}{5}+2\frac{4}{7}-5\frac{1}{2}-1\frac{3}{5}+2\frac{8}{35}$.

(7) $7\frac{1}{2}+3\frac{1}{9}-5\frac{7}{18}+2\frac{5}{6}-3\frac{2}{3}$. (8) $2\frac{1}{9}+7\frac{1}{3}-2\frac{5}{6}-4\frac{7}{18}+3\frac{1}{2}$.

(9) $8\frac{1}{3}$ of $\frac{6}{35}+2\frac{2}{3}-4\frac{4}{9}$ of $\frac{7}{10}$. (10) $2\frac{3}{4}-1\frac{1}{8}+5\frac{1}{3}+2\frac{5}{6}-8\frac{2}{3}$.

(11) $2\frac{1}{4}-3\frac{1}{8}$ of $\frac{2}{5}$ of $\frac{3}{8}+1\frac{1}{9}$ of $4\frac{1}{2}$.

(12) $10\frac{1}{2}-4\frac{6}{7}-6\frac{3}{14}+7\frac{5}{9}+8\frac{7}{8}-6\frac{23}{42}$.

(13) $2\frac{1}{2}-4\frac{7}{8}-10\frac{5}{12}-3\frac{9}{20}+3\frac{1}{9}+20\frac{2}{5}$.

(14) $13\frac{4}{9}-2\frac{1}{10}$ of $\frac{11}{14}$ of $\frac{1}{4\frac{2}{5}}+4\frac{1}{5}$ of $3\frac{4}{7}-\frac{7\frac{1}{9}}{3\frac{1}{3}}$.

(15) $2\frac{1}{5}$ of $8\frac{1}{3}$ of $\frac{3}{11}+\frac{2\frac{1}{9}}{3\frac{1}{6}}-\frac{1}{7}$ of 35.

(16) $8\frac{1}{3}$ of $7\frac{1}{2}+2\frac{1}{9}$ of $\frac{4\frac{1}{2}}{14\frac{1}{4}}-7\frac{1}{3}$ of $1\frac{1}{11}$.

(17) $\frac{5}{6}$ of $\dfrac{\frac{7\frac{1}{3}}{11}}{12}-2\frac{1}{9}$ of $\frac{7}{13}$ of $2\frac{1}{19}+12\frac{1}{10}$.

(18) $3\frac{1}{5}$ of $5\frac{1}{7}-2\frac{2}{3}+3\frac{1}{5}$ of $\frac{3}{8}-\frac{3\frac{5}{9}}{2\frac{2}{3}}$.

B. Simplify the following complex fractions:

(1) $\dfrac{2\frac{1}{3}\text{ of }\frac{4}{7}}{5\frac{1}{9}\text{ of }\frac{3}{23}}$. (2) $\dfrac{2\frac{1}{5}\text{ of }8\frac{1}{3}}{2\frac{7}{9}\text{ of }11\frac{2}{3}}$. (3) $\dfrac{3\frac{1}{2}\text{ of }\frac{9}{14}}{3\frac{1}{2}+\frac{9}{14}}$.

(4) $\dfrac{1\frac{3}{4}-1\frac{2}{5}}{1\frac{5}{9}}$. (5) $\dfrac{2\frac{1}{2}}{3\frac{1}{3}+2\frac{1}{2}}$. (6) $\dfrac{7\frac{1}{3}}{10\frac{1}{5}-7\frac{1}{3}}$.

(7) $\dfrac{3\frac{7}{9}\text{ of }\dfrac{3}{17}}{3\frac{7}{9}+5\frac{2}{3}}$. (8) $\dfrac{1\frac{1}{3}+2\frac{1}{2}}{2\frac{1}{2}-1\frac{1}{3}}$. (9) $\dfrac{3\frac{1}{7}-2\frac{3}{8}}{8\frac{3}{5}\text{ of }17\frac{1}{2}}$.

(10) $\dfrac{2\frac{1}{5}+3\frac{7}{10}}{4\frac{1}{3}-2\frac{5}{6}}$. (11) $\dfrac{7\frac{7}{12}+3\frac{2}{3}}{7\frac{7}{12}-3\frac{2}{3}}$. (12) $\dfrac{2\frac{1}{7}+3\frac{9}{14}}{3\frac{1}{3}\text{ of }\dfrac{2}{5}+7\frac{1}{8}}$.

(13) $\dfrac{5\frac{1}{7}+3\frac{1}{9}}{7\frac{11}{12}-1\frac{1}{4}\text{ of }1\frac{8}{21}}$. (14) $\dfrac{8\frac{1}{2}+7\frac{1}{5}\text{ of }\dfrac{7}{12}}{8\frac{1}{2}-7\frac{1}{5}+\dfrac{7}{12}}$.

(15) $\dfrac{5\frac{1}{2}\text{ of }\dfrac{3}{11}+2\frac{5}{6}\text{ of }\dfrac{4}{17}}{5\frac{1}{2}\text{ of }\dfrac{3}{11}-2\frac{5}{6}\text{ of }\dfrac{4}{17}}$. (16) $\dfrac{2\frac{1}{4}+3\frac{1}{5}}{5\frac{1}{2}\times\dfrac{1\frac{1}{2}}{3}}$.

C. Simplify the following continued fractions:

(1) $\dfrac{1}{2+\dfrac{1}{3}}$. (2) $\dfrac{2}{3+\dfrac{1}{2+\dfrac{1}{4}}}$. (3) $\dfrac{2}{1+\dfrac{3}{4+\dfrac{1}{2}}}$.

(4) $\dfrac{2}{5+\dfrac{3}{4+\dfrac{1}{8}}}$. (5) $2+\dfrac{1}{3+\dfrac{4}{5+\dfrac{1}{6}}}$. (6) $8+\dfrac{1}{2+\dfrac{5}{7+\dfrac{1}{2}}}$.

(7) $3+\dfrac{1}{2+\dfrac{3}{5+\dfrac{1}{2}}}$. (8) $\dfrac{1}{2+\dfrac{1}{3+\dfrac{1}{4+\dfrac{1}{5}}}}$. (9) $7+\dfrac{2}{1+\dfrac{3}{5+\dfrac{2}{5}}}$.

(10) $$2+\cfrac{3}{1+\cfrac{3}{6+\cfrac{4}{5+\cfrac{1}{3}}}}.$$

EXERCISE XXII.

Find the value of

1. $\frac{3}{7}$ of £1. 12*s*. 6*d*. 2. $\frac{5}{9}$ of 20 cwts. 2 qrs. 11 lbs.

3. $\frac{2}{5}$ of 8 tons 10 cwts. 3 qrs. 17 lbs. 4. $2\frac{3}{5}$ of £16. 7*s*. 8*d*.

5. $3\frac{1}{9}$ of 5 ac. 2 ro. 33 po. 6. £8. 9*s*. $7\frac{1}{4}$*d*. × $12\frac{2}{3}$.

7. £13. 5*s*. $7\frac{1}{4}$*d*. × $7\frac{5}{11}$. 8. 12 cub. yds. 20 cub. ft. 100 cub. in. ÷ $1\frac{5}{7}$.

9. £11. 12*s*. 6*d*. ÷ $\frac{9}{16}$. 10. 15 ac. 3 ro. 25 po. ÷ $\frac{15}{19}$.

11. $\frac{7}{29}$ of £3. 14*s*. $10\frac{1}{3}$*d*. 12. $4\frac{3}{7}$ of £5. 16*s*. $2\frac{3}{11}$*d*.

13. £8. 10*s*. $1\frac{1}{3}$*d*. ÷ $\frac{4}{15}$. 14. £6. 8*s*. $10\frac{2}{3}$ ÷ $2\frac{1}{3}$.

15. 3 lbs. 11 oz. 17 dwts. $19\frac{1}{5}$ grs. × $1\frac{2}{3}$. 16. 3 po. 3 yds. 2 ft. 3 in. ÷ $2\frac{1}{10}$.

17. $\frac{4}{15}$ of £1 + $\frac{5}{8}$ of 1*s*. + $\frac{5}{28}$ of £1. 1*s*. + $\frac{3}{5}$ of £1. 6*s*. 8*d*.

18. $\frac{1}{2}$ of 16*s*. $6\frac{1}{4}$*d*. + $\frac{1}{3}$ of 12*s*. $10\frac{1}{4}$*d*. + $\frac{1}{6}$ of £2. 4*s*. $8\frac{3}{4}$*d*.

19. $\frac{3}{5}$ of £2 + $\frac{4}{19}$ of £39. 0*s*. 7*d*. − $2\frac{1}{2}$ of 10*s*. 6*d*.

20. £4. 17*s*. $8\frac{1}{4}$*d*. + £3. 13*s*. $1\frac{1}{28}$*d*. − $1\frac{3}{7}$ of £2. 9*s*. $6\frac{1}{2}$*d*.

EXERCISE XXIII.

1. Reduce 2*s.* 6*d.* to the fraction of 10*s.*

2. Reduce £19. 10*s.* to the fraction of £26. 13*s.* 4*d.*

3. Reduce £5. 5*s.* 6*d.* to the fraction of £26. 7*s.* 6*d.*

4. Reduce 2*s.* 7¼*d.* to the fraction of £5.

5. Reduce 3*s.* 4½*d.* to the fraction of £4. 1*s.*

6. Reduce £17. 5*s.* 8*d.* to the fraction of £20. 10*s.* 4*d.*

7. Reduce 3 qrs. 14 lbs. to the fraction of 3 cwts. 1 qr.

8. Reduce 2 cwts. 3 qrs. to the fraction of 5 cwts. 2 qrs. 11 lbs.

9. Reduce 2 yds. 1 ft. to the fraction of 5 yds. 2 ft.

10. Reduce 1 ac. 2 ro. to the fraction of 3 ro. 26 po.

11. Reduce 3 yds. 2 ft. 7 in. to the fraction of 15 yds. 1 ft. 2 in.

12. Reduce 3 furl. 120 yds. 2 ft. 8 in. to the fraction of 1 mile.

13. What fraction is £3. 2*s.* 6*d.* of £5. 15*s.*?

14. What fraction is £2. 7*s.* 6*d.* of £17. 13*s.* 4*d.*?

15. What fraction of £2. 17*s.* 8*d.* is £1. 4*s.* 6*d.*?

16. What fraction of a guinea is 3*s.* 6*d.*?

17. What part of 18 lbs. 4 oz. 8 drs. is 15 lbs. 7 oz. 8 drs.?

18. What part of 18 cwts. 1 qr. 7 lbs. is 8 cwts. 2 qrs. 14 lbs.?

19. What part of 31 yds. 1 ft. 6 in. is 3 yds. 1 ft. 6 in.?

20. What part of 1 ton ~~2 qrs. 21 lbs.~~ is 4 cwts. 3 qrs. 14 lbs.?

77 lbs

EXERCISE XXIV.

1. Reduce $3\frac{1}{8}$ of £8. 9*s*. 4*d*. to the fraction of £26. 5*s*.

2. Reduce $2\frac{2}{5}$ of £12. 5*s*. 10*d*. to the fraction of £24. 18*s*.

3. Reduce $7\frac{1}{7}$ of £29. 9*s*. 2*d*. to the fraction of £50. 4*s*. 2*d*.

4. Reduce $1\frac{1}{13}$ of 6*s*. 6*d*. to the fraction of 6*s*. $1\frac{1}{2}$*d*.

5. Reduce $3\frac{1}{5}$ of £18. 11*s*. 8*d*. to the fraction of 16 guineas.

6. Reduce $7\frac{1}{2}$ of £5. 9*s*. 6*d*. to the fraction of £31. 11*s*. 3*d*.

7. Reduce $\frac{5}{8}$ of £19. 8*s*. 6*d*. to the fraction of £11. 6*s*. 10*d*.

8. Reduce $2\frac{1}{9}$ of £27. 18*s*. $4\frac{1}{2}$*d*. to the fraction of £39. 19*s*. 7*d*.

9. Reduce $1\frac{5}{6}$ of £18. 9*s*. 3*d*. to the fraction of £27. 11*s*. 10*d*.

10. Reduce $4\frac{2}{9}$ of 4 lbs. 6 oz. 10 dwts. 3 grs. to the fraction of 19 lbs. 1 dwt. 14 grs.

11. What fraction of £58. 5*s*. 6*d*. is $\frac{36}{37}$ of £17. 2*s*. 3*d*.?

12. What fraction of £174. 16*s*. 6*d*. is $\frac{9}{37}$ of £136. 18*s*.?

13. What fraction of £49. 10*s*. is $2\frac{2}{5}$ of £10. 6*s*. 3*d*.?

14. What fraction of £211. 2*s*. 2*d*. is $2\frac{4}{5}$ of £174. 16*s*. 8*d*.?

15. What part of 28 tons 14 cwts. 3 qrs. 14 lbs. is $\frac{7}{9}$ of 18 tons 13 cwt. 2 qrs.?

16. What part of $\frac{5}{6}$ of £50. 10*s*. 8*d*. is $2\frac{2}{3}$ of £12. 11*s*. 3*d*.?

17. What part of $1\frac{8}{11}$ of £33. 12*s*. 10*d*. is $2\frac{4}{5}$ of £11. 15*s*. 10*d*.?

18. What part of $4\frac{4}{9}$ of £8. 11*s*. $11\frac{1}{4}$*d*. is equal to $1\frac{2}{3}$ of £14. 6*s*. $6\frac{3}{4}$*d*.?

19. What fraction of $2\frac{4}{9}$ of $5\frac{3}{4}$*d*. is 1*s*. 5*d*.? and what fraction is $2\frac{1}{2}$*d*. of $3\frac{1}{3}$*d*.?

20. Reduce $\frac{5}{8}$ of $6\frac{3}{4}$ of £1. 3*s*. $6\frac{1}{2}$*d*. to the fraction of $9\frac{5}{12}$ of £3. 2*s*. $4\frac{1}{4}$*d*.

EXERCISE XXV.

MISCELLANEOUS EXAMPLES IN VULGAR FRACTIONS.

1. Add together £2. 1*s.* $9\frac{5}{6}$*d.*, £4. 5*s.* $6\frac{5}{12}$*d.*, and £6. 10*s.* $1\frac{1}{4}$*d.*

2. Divide $\frac{3}{8}$ of $5\frac{1}{3}$ by $\frac{54}{119\frac{3}{7}}$; and $2\frac{1}{2}$ of $\frac{4}{25}$ by $3\frac{1}{8}+4\frac{1}{3}$ of $1\frac{2}{7}$.

3. Simplify

(1) $4\frac{1}{3}$ of $2\frac{1}{4}-2\frac{1}{12}+3\frac{5}{6}$ of $3\frac{3}{8}+\frac{12\frac{1}{7}}{3\frac{3}{5}}$.

(2) $\frac{1\frac{1}{4}}{1\frac{1}{12}}$ of $\frac{2}{3}+\frac{2\frac{1}{2}-1\frac{5}{6}}{\frac{1}{4}+1\frac{5}{6}}-\frac{8\frac{1}{5}}{7\frac{1}{5}}$.

4. Find the continued product of

$24\frac{2}{3}$, $\frac{1}{4}$, $11\frac{3}{5}$, $\frac{3}{29}$, and $\frac{5}{37}$; and of $15\frac{1}{2}$, $\frac{1}{3}$, $16\frac{2}{5}$, $\frac{3}{31}$, and $\frac{5}{41}$.

5. Arrange in order of magnitude the fractions $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{4}{5}$.

6. Divide $\dfrac{1+\frac{1}{3}}{1-\frac{1}{3}}$ by $\dfrac{1+\frac{3}{5}}{1-\frac{3}{5}}$; and $\dfrac{1+\frac{1}{5}}{1-\frac{1}{5}}$ by $\dfrac{1+\frac{5}{13}}{1-\frac{5}{13}}$.

7. Multiply

$\dfrac{1-\frac{18}{25}}{3\frac{1}{3}+\frac{2\frac{3}{4}}{\frac{3}{4}}}$ by $\left\{\dfrac{1+\frac{2}{3}}{1-\frac{2}{3}}\right\}^2$; and $\dfrac{1-\frac{4}{9}}{3\frac{1}{4}+1\frac{1}{2}+\frac{1\frac{2}{3}}{6\frac{2}{3}}}$ by $\left\{\dfrac{1+\frac{1}{2}}{1-\frac{1}{2}}\right\}^2$.

8. Subtract $\dfrac{3\frac{4}{5}+\dfrac{29}{45}}{3\frac{3}{4}+14\frac{1}{36}}$, from $\dfrac{7\frac{1}{2}+1\frac{17}{22}}{8\frac{2}{3}+3\frac{23}{33}}$.

9. Reduce $\dfrac{2\dfrac{7\dfrac{5\frac{1}{2}}{12}}{20}}{25}$ of £50 to pounds, shillings, and pence.

10. Simplify $\dfrac{2\frac{1}{3}}{7}+\dfrac{4}{10\frac{1}{2}}-\dfrac{8}{15}$ of $\dfrac{3}{28}$, and divide the result by $4\frac{6}{7}$.

11. Find the difference between the product and quotient of $2\frac{1}{4}$ and $1\frac{1}{8}$; and between the sum and product of $7\frac{1}{2}$ and $3\frac{1}{5}$.

12. Add together $\dfrac{\dfrac{1}{3}-\dfrac{1}{4}}{\dfrac{1}{5}-\dfrac{1}{11}}$ and $\dfrac{\dfrac{1}{2}\text{ of }\dfrac{3}{4}-\dfrac{5}{6}\text{ of }\dfrac{2}{3}}{\dfrac{1}{8}\text{ of }1\frac{5}{11}-\dfrac{2}{11}\text{ of }16\frac{1}{2}}$.

13. Find the sum of £8. 12*s*. $7\frac{1}{2}\frac{1}{4}$*d*., £10. 9*s*. $11\frac{3}{8}$*d*., £4. 10*s*. $0\frac{7}{36}$*d*., and £11. 19*s*. $10\frac{5}{8}$*d*.

14. Divide the difference between $3\frac{2}{5}$ and $1\frac{1}{2}$ by the product of $3\frac{1}{6}$ and $1\frac{1}{5}$.

15. A gentleman distributed a sum of money among three poor persons; he gave $\frac{1}{4}$ of it to the first, $\frac{2}{3}$ of the remainder to the second, and 10*s*., which was then left, to the third. What sum did each receive?

16. Simplify

(i) $$\frac{\frac{1}{2} \text{ of } \frac{5}{9} \times 7\frac{1}{5}}{\frac{1}{3} + 4\frac{1}{2} \text{ of } \frac{4}{27}} + \frac{\frac{4}{5} - 2\frac{1}{3} + 1\frac{8}{15}}{\frac{7}{95} + 150\frac{5}{19} - 74\frac{2}{5}}.$$

(ii) $$\frac{2\frac{1}{8} \text{ of } \frac{3}{17} \text{ of } 2\frac{2}{3}}{\frac{1}{2} + \frac{2}{19} \text{ of } 28\frac{1}{2}} - \frac{2\frac{1}{5} \text{ of } \frac{3}{11} \text{ of } 1\frac{2}{3}}{2\frac{3}{8} + \frac{3}{4} + \frac{1}{2} \text{ of } \frac{3}{4}}.$$

17. Divide the product of $6\frac{3}{7}$ and $\frac{5\frac{1}{6} - 4\frac{7}{12}}{12\frac{2}{3} - 7\frac{5}{12}}$ by $\frac{1 + \frac{1}{2\frac{1}{3}}}{2}$.

18. What fraction must be added to $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ to make a total of $1\frac{1}{3}$?

19. Add together $\frac{1}{2}$ of $\frac{3}{4}$ of $\frac{2}{3}$, $\frac{3}{4} + \frac{2}{15} - \frac{5}{12} + \frac{1}{3} - \frac{23}{30}$, and $\frac{1}{2 + \frac{1}{3\frac{1}{4}}}$.

20. Find the quotient when $\frac{3\frac{5}{7} \div 2\frac{4}{11}}{\frac{5}{7} \text{ of } (11\frac{3}{4} - 2\frac{1}{8})}$ is divided by $\frac{3\frac{2}{9} \text{ of } 5\frac{2}{5}}{5\frac{1}{16} + \frac{1}{2} \text{ of } 4\frac{3}{8}}$.

21. Reduce $\frac{3\frac{1\frac{3}{14}}{4}}{20}$ of a ton to cwts., qrs., and lbs.

22. Simplify $\frac{2\frac{1}{2} - \frac{5}{6}}{2\frac{1}{2} + \frac{5}{6}} + \frac{7}{12} \text{ of } \frac{9 \times 10}{14 \times 3} - \frac{22\frac{1}{2}}{30}$.

23. If A be $\frac{1}{2}$ of $2\frac{2}{3}$ of B, and C be $1\frac{1}{5}$ of B, what fraction is A of C?

24. Reduce 1*s.* $3\frac{1}{2}$*d.* to the fraction of 3*s.* 4*d.*; $1\frac{5}{8}$*d.* to the fraction of $3\frac{1}{3}$*d.*; and 1*s.* $5\frac{1}{3}$*d.* to the fraction of 5*s.* $6\frac{1}{2}$*d.*

25. Divide £120. 7*s.* $10\frac{1}{4}$*d.* by $8\frac{7}{9}$, and multiply the result by $9\frac{7}{9}$.

26. Reduce 14 wks. 6 d. 23 hr. 45 min. 20 sec. to the fraction of a year consisting of $365\frac{1}{4}$ days.

27. A man left to his widow one-fourth of his property, to his eldest son one-half, to each of his two younger sons one-fifteenth, the remaining £350 being paid in legacies. Find the amount of the whole, and the share of each person.

28. What fraction of an inch is $\frac{11}{16}$ of a yard? and what fraction of a guinea is 3*s.* $9\frac{1}{4}$*d.*?

29. What fraction of a sovereign is the sum of a half-guinea, a mark of 13*s.* 4*d.*, a half-crown, and a three-penny piece; and what equal number of each of the above coins will together amount to £1276?

30. Reduce each of the following to its simplest form:

(1) $$\left\{\frac{2\frac{1}{4}-\frac{2}{3}\text{ of }1\frac{5}{6}}{\frac{1}{5}\text{ of }3\frac{1}{3}+\frac{13}{36}}-\frac{1}{2\frac{1}{2}}\right\}\div\frac{5\frac{1}{4}}{8\frac{3}{4}}.$$

(2) $$\frac{2\frac{1}{3}+5\frac{1}{2}}{2\frac{1}{5}-1\frac{1}{6}}+\frac{2\frac{1}{9}+3\frac{1}{7}\text{ of }1\frac{3}{11}}{4\frac{1}{5}\text{ of }3\frac{1}{7}-1\frac{2}{9}}.$$

(3) $$\frac{3\frac{1}{9}+2\frac{5}{6}}{3\frac{1}{9}-2\frac{5}{6}}+\frac{3\frac{1}{2}\text{ of }3\frac{1}{7}}{3\frac{1}{2}\div\frac{7}{11}}-\frac{9\frac{1}{3}}{7}.$$

(4) $$\frac{2\frac{1}{2}+1\frac{1}{4}-2\frac{1}{3}}{3\frac{3}{4}+2\frac{1}{3}-4\frac{1}{4}}\times\frac{\frac{9}{49}-\frac{4}{25}}{\frac{75}{121}-\frac{16}{27}}\div\frac{\frac{3}{7}+\frac{2}{5}}{\frac{5}{11}+\frac{4}{9}}.$$

EXERCISE XXVI.

DECIMALS.

A. State the value of each figure in the following numbers:

(1) 37; 216; 548971; 360; 4057; 300501.

(2) ·7; ·71; ·071; ·0701; ·00009.

(3) 5·9; 50·09; 361·007; 32·0759; 7·00001.

B. Express as vulgar fractions in their lowest terms:

(1) ·2; ·024; ·0048; ·506; ·375; ·005; ·0608.

(2) 3·17; 41·015; 376·275; 970·00004; 7321·0505; 2·6755; 301·301.

(3) 72·75; 2·56; 9·4158; 307·251; 8·9125; ·2175; 9·832.

C. Express as decimals:

(1) $\frac{3}{10}$; $\frac{13}{100}$; $\frac{407}{1000}$; $\frac{17}{10000}$; $\frac{963}{100000}$; $\frac{9}{1000000}$; $\frac{47}{10000000}$.

(2) $\frac{47}{10}$; $\frac{559}{10}$; $\frac{801}{100}$; $\frac{459183}{10}$; $\frac{21717}{10000}$; $\frac{4191589}{1000}$; $\frac{275711}{10000}$.

(3) $\frac{57}{1000}$; $\frac{231}{10}$; $\frac{51}{10000}$; $\frac{303}{10000}$; $\frac{2709}{100}$; $\frac{11}{10000}$; $\frac{877}{100}$.

D. Multiply

(1) ·024, 3·15, 18·1, and 4·008 by 10.
(2) 76·05, ·9102, 14·17, and 170·1 by 1000.
(3) 18·15, ·00008, 141·2, and 7·891 by 100000.

E. Divide

(1) 2·75, ·0081, 371, and ·8004 by 100.
(2) 3·157, 23, ·0087, and ·3 by 10000.
(3) ·751, ·007, 1·9, and 256 by 1000000.

F. Write in words:

·1; 1·01; 3·7581; ·000815; 27·071; 10·0005; 76·00011.

G. Write as decimals:

Fifteen hundredths; seven millionths; two hundred, and eleven thousandths; ten, and three hundred-thousandths; four hundred and fifteen thousandths; sixty-five thousand, and sixty-five thousandths; two, and twenty-nine hundredths.

EXERCISE XXVII.

A. Add together

(1)	(2)	(3)
17·215	231·8	·3
3·0567	45·001	29·157
·009	2·7169	8·0016
2·07195	4567·21	155
365	·00087	77·29
54·75	6·05	·0052

(4)	(5)
20·02	61
576·89174	3·16004
1·0008159	·0478
·423564	21·805
29	1·00006
7·21685	12·9871

B. Find the value of

(1) 25·29 + 367·5 + 2·091 + ·57689 + ·21.
(2) 260 + 25·41 + ·89712 + 1·2 + 55·913.
(3) ·44 + 66 + 3·715 + 44·623 + 13·7.
(4) 6·9 + 5·71 + ·0431 + 329·2 + 4·4.

C. Find the sum of

(1) 3·5, ·475, 350·1, 12·05, 374, and ·0008.
(2) ·05768, 22·54, ·0005, 361, and 5·02.
(3) 29·15, 2·8601, ·0051, 321·2, and 3·15.
(4) 3·571, ·008, 12·51, 649, and 3·051.

D. Add together first as decimals, and then as vulgar fractions :

(1) 3·29, 15·671, ·0053, and 22·67.
(2) 14·2351, 651, 2·219, and 3·157.
(3) 213·7, 2·913, 14·769, and ·007871.
(4) 15·753, 2·069, 17·6143, and 3·2107.

EXERCISE XXVIII.

A. (1) From 37·2914
take 32·4673

(2) From 294·1453
take 27·9347

(3) From 52·008271
take 35·05719

(4) From 276·51
take 32·37428

(5) From 376
take 22·593

(6) From 129
take ·267

B. Subtract

(1) 9·89 from 12·57; and 3·91785 from 4·53.
(2) 4·7516 from 5·8906; and ·8573 from 2·01.
(3) 1·481 from 3·971; and 43·92876 from 55·01.

C. Find the value of

(1) 45·21 − 38·793; and 7 − ·7.

(2) 18 − ·18 and 445·63 − 3·1263.

D. Find the difference between

(1) 22·91 and 12·05. (2) 360·1 and 44·912.

(3) 2·34 and 1·94. (4) 15·719 and ·15719.

E. Find the value of

(1) 34·21 + 17·04 + 12·0567 − 3·51 − 16·8406.

(2) 15·375 + 1·2941 − 12·31 + 27·04 − 3·6209.

(3) 227·9 − 420·315 − 27·291 + 865·21 − 1·057.

(4) 21·586 − 2·0568 − 15·7124 − ·00576 − 3·8113.

(5) 2·194 + 15·367 − 10·009 − 11·25 + 5·8.

(6) 47·9 − 3·214 − 17·002 + 13·67 + ·05713.

EXERCISE XXIX.

A. Multiply

(1) 17·4 by 2·3. (2) 3·18 by ·34.

(3) 98·21 by 1·515. (4) 237·07 by 4·567.

(5) 7·878 by 39·39. (6) 473·89 by 3·1265.

B. Find the product of

(1) 61·37 and ·01385. (2) 3·12 and 2·0001.

(3) 3·005 and 40·23. (4) 1·279 and ·0008787.

C. Find the value of

(1) 3·51 × ·075. (2) ·0167 × ·008448.

(3) ·354178 × ·005. (4) 2·07 × 3·16 × 4·14.

(5) 35·04 × ·0008 × 5·25. (6) 7·6 × ·071 × 2·1 × 29.

D. Find the continued product of

(1) 11218·75, 2·5, and ·0064.

(2) ·000128, ·015, and 75.
(3) 2573·5, ·00001, 4·75, and 2·2.
(4) 7·6, ·045, 13, and ·0002.

E. Multiply together, first as decimals, and then as vulgar fractions:

(1) ·25 and 3·2.
(2) 6·4 and ·075.
(3) 4·65, ·025, and ·08.
(4) 5·75, 13·275, 40, and ·215.
(5) 315, 6·72, 4·5, and ·016.

EXERCISE XXX.

A. Divide

(1) 16·578 by 5·4; and 55·6591 by 1·813.
(2) 63·8976 by 20·8; and 7·75 by 3·2.
(3) 48·591 by ·96; and 4·126 by 640.
(4) ·74 by ·25; and 3·74 by ·25.
(5) ·008 by ·25; and ·0774 by 480.
(6) 2·56 by ·0032; and 71·8 by ·0064.
(7) 56·25 by 7·5; and 7·236 by ·0225.

B. Find the value of

(1) 3·1 ÷ ·0025; and ·8499745 ÷ 2·77.
(2) 79·1 ÷ ·125; and ·00177089 ÷ 3·74.
(3) ·0012 ÷ 1·6; and ·8 ÷ 3·2.
(4) ·251 ÷ ·125; and 7·62129 ÷ 8·73.
(5) 191·1 ÷ 5·46; and ·0096 ÷ 75.

(6) ·008 ÷ 1·28; and ·0007 ÷ 896.

(7) 2·684 ÷ 1·22; and 21·3 ÷ 37·5.

C. Find the quotient in the division of

(1) ·00079 by 500; and 202 by ·01.

(2) 1·872 by ·312; and ·1872 by ·0312.

(3) 140·02564 by 1·871; and 1400·2564 by ·1871.

(4) ·758 by 3·2; and ·0758 by ·64.

(5) 13099·52 by ·0011008; and 13·09952 by 11008.

(6) 406·8 by ·018; and 4·068 by 18.

(7) 3·9 by 150; and 1 by 625.

D. Reduce to decimals:

(1) $\frac{3}{375}$; $\frac{23}{16}$; $\frac{3751}{25}$.

(2) $\frac{9}{96}$; $\frac{1}{500}$; $\frac{17}{64}$.

(3) $\frac{5781}{8}$; $\frac{219}{256}$; $\frac{323}{625}$.

(4) $\frac{410632884}{43800}$; $\frac{33}{3125}$; $\frac{171}{32}$.

(5) $\frac{13}{32\frac{1}{2}}$; $\frac{17}{12\frac{4}{5}}$; $\frac{14\frac{1}{10}}{125}$.

(6) $\frac{17\frac{1}{8}}{12\frac{1}{2}}$; $\frac{6\frac{3}{4}}{11\frac{1}{4}}$; $\frac{3}{19\frac{1}{5}}$.

(7) $\frac{25}{\cdot 00125}$; $3\frac{5}{8}$ of $\frac{1}{512}$; $2\frac{1}{5} + 3\frac{1}{3}$ of $\frac{4\cdot 155}{277}$.

EXERCISE XXXI.

A. **Express as vulgar fractions:**

(1) $\cdot\dot{8}$; $2\cdot\dot{7}$; $2\cdot\dot{0}\dot{7}$; $2\cdot0\dot{7}$.

(2) $11\cdot8\dot{5}$; $2\cdot\dot{5}7\dot{8}$; $3\cdot04\dot{1}$; $5\cdot\dot{8}9\dot{6}$.

(3) $\cdot000\dot{1}\dot{7}$; $\cdot\dot{1}00\dot{7}$; $\cdot1\dot{0}0\dot{7}$; $\cdot1\dot{0}08\dot{0}$.

B. **Reduce to vulgar fractions in their lowest terms:**

(1) $\cdot5\dot{9}\dot{1}$; $\cdot59\dot{1}$; $\cdot\dot{5}9\dot{1}$; $\cdot5\dot{9}1\dot{0}$.

(2) $2\cdot\dot{3}$; $4\cdot0\dot{4}\dot{5}$; $2\cdot0\dot{1}\dot{2}$; $\cdot25\dot{6}\dot{1}$.

(3) $4\cdot\dot{9}0\dot{9}$; $3\cdot1\dot{4}\dot{5}$; $\cdot15\dot{7}$; $\cdot0\dot{2}\dot{8}$.

(4) $\cdot5\dot{7}9\dot{1}$; $3\cdot9\dot{7}\dot{2}$; $4\cdot7\dot{8}\dot{1}$; $3\cdot8\dot{7}\dot{2}$.

(5) $\cdot0\dot{0}7\dot{5}$; $\cdot00\dot{7}\dot{5}$; $\cdot007\dot{5}$; $\cdot0\dot{7}0\dot{5}$.

(6) $\cdot\dot{2}8571\dot{4}$; $\cdot\dot{4}2857\dot{1}$; $\cdot0\dot{7}1428\dot{5}$; $\cdot0\dot{5}\dot{4}$.

C. **Express as decimals:**

(1) $\frac{46}{99}$; $\frac{57}{9}$; $\frac{267}{900}$; $\frac{4561}{990}$.

(2) $\frac{1}{99}$; $\frac{17}{9990}$; $\frac{43}{9900}$; $\frac{7}{990}$.

(3) $\frac{1}{45}$; $\frac{13}{33}$; $\frac{51}{495}$; $\frac{325}{66}$.

(4) $\frac{45}{111}$; $\frac{1291}{5550}$; $\frac{1324}{142857}$; $\frac{557}{285714}$.

(5) $\frac{4}{130}$; $\frac{1}{7}$; $\frac{2}{85}$; $\frac{49}{31}$.

(6) $\frac{37}{6}$; $\frac{1}{37}$; $\frac{6}{55}$; $\frac{755}{23}$.

(7) $\frac{27}{22}$; $\frac{111}{180}$; $\frac{36}{63}$; $\frac{1}{21}$.

EXERCISE XXXII.

A. Find the value of

(1) $3\cdot\dot{2}\dot{5}+4\cdot\dot{7}+290\cdot0\dot{2}+\cdot3\dot{6}+21+\cdot\dot{1}\dot{4}$.

(2) $9\cdot0\dot{7}\dot{3}+\cdot\dot{8}+21\cdot\dot{0}\dot{2}+23\cdot0\dot{2}+\cdot59\dot{3}+2\cdot\dot{1}\dot{4}$.

(3) $15\cdot\dot{5}+1\cdot\dot{2}\dot{3}+46\cdot\dot{7}15\dot{0}+317+2\cdot0\dot{7}\dot{5}+14\cdot\dot{0}\dot{1}$.

B. Find the value of

(1) $22\cdot\dot{7}\dot{6}-13\cdot\dot{4}\dot{1}$; and $22\cdot7\dot{6}-13\cdot4\dot{1}$.
(2) $22\cdot\dot{7}\dot{6}-13\cdot4\dot{1}$; and $22\cdot7\dot{6}-13\cdot\dot{4}\dot{1}$.
(3) $14\cdot\dot{2}\dot{3}-9\cdot\dot{1}\dot{2}$; and $14\cdot2\dot{3}-9\cdot\dot{1}\dot{2}$.
(4) $14\cdot23-9\cdot\dot{1}\dot{2}$; and $14\cdot\dot{2}\dot{3}-9\cdot12$.
(5) $5\cdot\dot{7}\dot{8}-2\cdot9\dot{1}$; and $7\cdot5\dot{8}-3\cdot\dot{0}\dot{1}$.

C. Find the value (to 7 places of decimals) of

(1) $2\cdot5\dot{9}11\dot{4}+31\cdot\dot{0}1\dot{7}+2\cdot715+\cdot\dot{3}0\dot{1}+156\cdot\dot{8}+2\cdot9\dot{1}\dot{3}$.

(2) $44\cdot\dot{1}9\dot{7}+15\cdot0\dot{8}\dot{1}+1\cdot\dot{8}234\dot{5}+12\cdot\dot{9}1\dot{0}+16\cdot23+\cdot\dot{0}89\dot{1}$.

D. Find the value of

(1) $5\cdot\dot{7}89\dot{2}-2\cdot3\dot{6}\dot{8}+17\cdot5\dot{4}+\cdot2105-12\cdot97\dot{6}\dot{1}-3\cdot21\dot{5}$.
(2) $14\cdot89\dot{7}\dot{6}-27\cdot\dot{3}15\dot{0}-49\cdot\dot{8}\dot{1}+15\cdot763+183+21\cdot\dot{0}\dot{5}$.

EXERCISE XXXIII.

A. Multiply

(1) $71\cdot8\dot{5}$ by 7; and $\cdot\dot{0}56\dot{3}$ by $1\cdot5$.
(2) $3\cdot\dot{5}$ by $\cdot8$; and $3\cdot5$ by $\cdot0\dot{8}$.
(3) $3\cdot\dot{9}\dot{1}$ by $\cdot022$; and $15\cdot\dot{0}7\dot{3}$ by $2\cdot4$.
(4) $7\cdot\dot{6}\dot{4}$ by $5\cdot\dot{9}$; and $36\cdot\dot{3}$ by $2\cdot\dot{6}$.
(5) $12\cdot\dot{9}8\dot{1}$ by $4\cdot\dot{7}\dot{2}$; and $\cdot\dot{3}$ by $\cdot\dot{2}\dot{7}$.
(6) $\cdot\dot{4}2857\dot{1}$ by $\cdot\dot{3}$ of $3\cdot\dot{8}$; and $2\cdot\dot{4}$ by $3\cdot\dot{1}+6\cdot\dot{8}$.

B. Divide

(1) $2\cdot\dot{5}1\dot{3}$ by 12; and $9\cdot\dot{4}\dot{0}$ by $1\cdot5$.

(2) $8\cdot5$ by $\cdot\dot{2}8571\dot{4}$; and $2\cdot7\dot{9}$ by $3\cdot1\dot{9}$.

(3) $15\cdot3\dot{8}$ by $5\cdot4\dot{9}$; and $3\cdot\dot{7}$ by $4\cdot\dot{5}$.

(4) $5\cdot4\dot{5}\dot{8}$ by $5\cdot\dot{4}\dot{5}$; and $7\cdot9\dot{4}$ by $6\cdot3\dot{9}$.

(5) $3\cdot\dot{6}$ by $2\cdot4$; and $11\cdot8\dot{3}$ by $\cdot24\dot{9}$.

(6) $\cdot9\dot{4}$ by $\cdot03\dot{7}$; and $\cdot\dot{3}\dot{6}$ by $\cdot\dot{6}\dot{3}$.

C. Find the value of

(1) $7\cdot\dot{5} \times \cdot015\dot{9}\dot{0}$; and $5\cdot8\dot{9} \times \cdot4\dot{9}$.

(2) $2\cdot2\dot{7} \times \cdot24\dot{9}$; and $15\cdot\dot{3} \times 1\cdot0\dot{5}$.

(3) $\cdot0\dot{1}\dot{8} \times \cdot\dot{2}2\dot{0}$; and $\cdot07\dot{3} \times 2\cdot\dot{7}\dot{2}$.

(4) $7\cdot3\dot{9} \div \cdot07\dot{9}$; and $7\cdot\dot{2} \div \cdot\dot{3}\dot{2}$.

(5) $\cdot89\dot{1} \div 1\cdot\dot{2}\dot{9}$; and $\cdot0\dot{0}5\dot{7} \div \cdot21\dot{3}$.

(6) $\cdot\dot{0}1\dot{5} \div 1\cdot\dot{6}$; and $\cdot12\dot{5} \div \cdot25\dot{1}$.

EXERCISE XXXIV.

Find the value of

1. ·25 of £1; ·175 of £1; ·02 of £1.

2. £1·15; £3·46875; £5·6125.

3. 3·02 of £10; ·075 of £5; ·785 of £10.

4. 2·775 of £1; ·875 of 10*s.*; 43·725 of 2*s.* 6*d.*

5. ·95 of a ton; 3·25 of a yard; 3·9825 of a lb. Troy.

6. ·2625 of a mile; 2·8125 of a cwt.; 15·325 of a pole.

7. ·675 of £3. 10*s.*; ·525 of £366. 6*s.* 8*d.*; ·75 of £52. 6*s.* 8*d.*

8. 7·75 of 1½ tons; ·375 of a pole; ·225 of 10*s.* 6*d.*

9. ·0474609375 of £21. 6*s.* 8*d.*; ·0125 of a cwt.; ·375 of £117.

10. 4·215 of £7; 2·125 of £8. 5*s.*; $\cdot\dot{2}$ of £3.

11. $\cdot 088541\dot{6}$ of £1 ; $1\cdot\dot{4}\dot{5}$ of 5*s*. 6*d*.; $7\cdot\dot{2}\dot{6}$ of 2*s*. 9¾*d*.

12. $\cdot\dot{2}8571\dot{4}$ of 5 yds. 2 ft. 6 in.; $3\cdot 2\dot{3}$ of 1½ acres; $3\cdot\dot{6}$ of 4 qrs. 4 bus.

13. $3\cdot 3\dot{4}\dot{5}$ of £4. 11*s*. 8*d*.; $2\cdot 01\dot{3}\dot{6}$ of £2. 1*s*. 3*d*.; $\cdot\dot{7}1428\dot{5}$ of 10*s*. 6*d*.

14. ·878125 of £1 + ·375 of a guinea − 5⅜ of 1*s*.

EXERCISE XXXV.

A. Express

(1) 18*s*. 4½*d*. as the decimal of £1; and £1. 16*s*. 9*d*. as the decimal of £1000.

(2) 17*s*. 9¾*d*. as the decimal of £1; and 6¾*d*. as the decimal of 1*s*.

(3) £5. 8*s*. 8½*d*. as the decimal of £4; and 17*s*. 4½*d*. as the decimal of £5.

(4) £22. 15*s*. 7½*d*. as the decimal of £20; and £9. 16*s*. 10½*d*. as the decimal of £50.

(5) 8 min. 15 sec. as the decimal of an hour; and 4 hrs. 18′ 22½″ as the decimal of 8 hrs.

(6) 2 qrs. 7 bus. 3 pks. 1 gal. as the decimal of 1 qr.; and 2 pks. 1 gal. 3 qts. as the decimal of 2 bushels.

(7) 15 cwts. 2 qrs. 21 lbs. as the decimal of 5 tons; and 10 lbs. 3 oz. 10 drs. as the decimal of 4 lbs.

(8) 3 ro. 35 po. as the decimal of an acre; and 2 ac. 2 ro. 28 po. as the decimal of 5 acres.

B. Reduce

(1) 2*s*. 6*d*. to the decimal of 6*s*. 8*d*.; and 12*s*. 9*d*. to the decimal of 7*s*. 6*d*.

(2) 2*s.* 3*d.* to the decimal of £1. 2*s.* 6*d.*; and 1*s.* 11*d.* to the decimal of 15*s.* 4*d.*

(3) 4*s.* 4*d.* to the decimal of £1. 7*s.* 1*d.*; and 15*s.* 7*d.* to the decimal of £2. 16*s.* 8*d.*

(4) 1 mi. 550 yds. to the decimal of 200 yds.; and 5 fur. 24 po. to the decimal of 3½ miles.

(5) 3 days 14 hrs. 25 min. to the decimal of 3 days 11 hrs. 20 min.; and 5 ac. 3 ro. 15 po. to the decimal of 1 ac. 2 ro. 32 po.

(6) 7 bus. 3 pks. 1 gal. to the decimal of 1 qr. 4 bus. 2 pks.; and 2 gal. 1 gill to the decimal of 1 gal. 2 qts. 1 pt.

(7) 10 oz. 8 drs. to the decimal of 2 st. 7 lbs.; and 15 cwts. 3 qrs. to the decimal of 2 tons 12 cwts. 2 qrs.

(8) 5 oz. 6 dwts. 11 grs. to the decimal of 8 oz. 10 dwts. 8 grs.; and 2 oz. 7 drs. 1 scr. 10 grs. to the decimal of 15 lbs. 8 oz.

C. Reduce

(1) £1. 18*s.* to the decimal of £14. 5*s.*; and 14*s.* 11¼*d.* to the decimal of 3*s.* 9*d.*

(2) £4. 9*s.* 10*d.* to the decimal of £5. 10*s.*; and £67. 10*s.* to the decimal of £1. 15*s.*

(3) £2. 2*s.* 1*d.* to the decimal of £4. 12*s.* 7*d.*; and £44. 12*s.* 6*d.* to the decimal of £9. 3*s.* 4*d.*

(4) 11 cwts. 2 qrs. 21 lbs. to the decimal of 4 tons 2 cwts. 2 qrs.; and 30 po. 3 yds. 2 ft. to the decimal of 2½ furlongs.

(5) 13 wks. 6 days 12 hrs. to the decimal of 52 weeks; and 13 hrs. 4 min. 20 sec. to the decimal of 1 day 2 hrs.

(6) 2 loads 4 qrs. 3 bus. to the decimal of 4 qrs. 4 bus.; and 3 pks. 1 gal. 2 qts. to the decimal of 2 pks. 3 qts.

(7) 1 lb. 9 oz. 15 grs. to the decimal of 7 lbs.; and 1 lb. 9 oz. 3 drs. to the decimal of 7 lbs.

(8) 3 cub. yds. 13 cub. ft. 864 cub. in. to the decimal of 3 cub. yds.; and 15 sq. yds. 3 sq. ft. 36 sq. in. to the decimal of 3 sq. yds.

D. Reduce

(1) 7$\frac{2}{5}$ of 13*s.* 4*d.* to the decimal of £78. 18*s.* 8*d.*; and $\frac{3}{5}$ of £1. 8*s.* 1½*d.* to the decimal of £3. 14*s.* 1½*d.*

(2) 2$\frac{1}{7}$ of £5. 6*s.* 8*d.* to the decimal of 7*s.* 6*d.*; and $\cdot4\dot{1}\dot{5}$ of £15. 8*s.* 11*d.* to the decimal of £2. 13*s.* 1*d.*

(3) $\cdot\dot{5}$ of £5. 10*s.* 4*d.* to the decimal of 5½ of £6. 17*s.* 11*d.*; and 3$\frac{1}{3}$ of £4. 15*s.* 4*d.* to the decimal of $\cdot\dot{2}\dot{7}$ of 16*s.* 3*d.*

(4) ·7 of £1. 3*s.* 10*d.* to the decimal of 5*s.* 6*d.*; and $\cdot\dot{3}$ of 6*s.* 4*d.* to the decimal of £2. 18*s.* 7*d.*

(5) ·001 of 36 hrs. 30 min. to the decimal of ½ a year; and $\cdot\dot{2}$ of 28 sq. perches 5 sq. yds. 3 sq. ft. to the decimal of 14 sq. po. 2 sq. yds. 6 sq. ft.

(6) 1$\frac{2}{3}$ of 4 oz. 4 drs. 1 scr. 16 grs. to the decimal of 10 oz.; and $\cdot\dot{3}$ of 7 drs. 2 scr. 8 grs. to the decimal of 1$\frac{1}{8}$ oz.

(7) $\cdot 5\dot{4}$ of 7 oz. 15 drs. to the decimal of $4\frac{1}{12}$ lbs.; and $2\cdot\dot{1}$ of 2 tons 13 cwts. 1 qr. 7 lbs. to the decimal of 19 tons.

(8) $3\cdot\dot{7}$ of 3 st. 7 lbs. to the decimal of $11\frac{1}{3}$ of 3 cwts. 56 lbs.; and $4\frac{1}{2}$ furlongs to the decimal of $7\frac{2}{5}$ of ·3125 of a league.

EXERCISE XXXVI.

Miscellaneous Examples in Decimals.

1. Add together $6\frac{1}{8}$, $23\frac{1}{2}$, 464, and 6·375.

2. Divide the product of 1·075 and ·0101 by ·43.

3. What fraction of 10*s.* is 4*s.* 6*d.*? Reduce the result to a decimal.

4. Reduce to decimals, and find the product of $3\frac{1}{7}$ and $3\frac{1}{2}$; and prove the result by working the sum in vulgar fractions.

5. Which is greater ·39 of a guinea, or $\cdot 40\dot{9}\dot{9}$ of £1?

6. Express as decimals, $\frac{2^5}{10^8}$ and $\frac{3^4}{10^5}$, and the sum and the product of these quantities.

7. Find the sum of $14\cdot 2\dot{7}\dot{5}$ of 2 ac. 3 ro., and $\cdot\dot{8}5714\dot{2}$ of 7 ac. 1 ro. 2 po.

8. Reduce 4*s.* $8\frac{1}{2}$*d.* to the decimal of £1; and 6*s.* 8*d.* to the decimal of 2*s.* 6*d.*

9. Find the difference between $5\frac{1}{2}$ guineas and £3·125, and reduce the result to the decimal of 2*s.* 6*d.*

10. Simplify $$\frac{\frac{5}{80} \text{ of } 11\cdot 02 + \frac{3}{50} \text{ of } 11\cdot 8}{\cdot 01}.$$

11. Simplify $\dfrac{4\frac{1}{2}-2{\cdot}64-3{\cdot}26+10\frac{1}{3}}{7\frac{1}{5}\text{ of }5\frac{5}{6}}$.

12. Express $\frac{3}{8}$ of 7*s.* 6*d.* + $\cdot625$ of 10*s.* − $\cdot5\dot{4}\dot{5}$ of 9*s.* 2*d.* as a decimal fraction of £10.

13. Reduce $\cdot890\dot{6}2\dot{5}$ to a vulgar fraction, and if the unit be £1, reduce the fraction to shillings, pence, and decimals of a penny.

14. Add together 2·095 hours, ·07 of a day, and ·05 of a week; and express the sum as a decimal of 365·25 days.

15. Shew that $3+\dfrac{1}{7+\dfrac{1}{16}}=3{\cdot}14159$ nearly.

16. Simplify $\dfrac{2{\cdot}\dot{1}\text{ of }3\frac{3}{7}\text{ of }1\frac{9}{19}}{5{\cdot}\dot{6}+3{\cdot}56+4{\cdot}94+8{\cdot}\dot{3}}$.

17. Find the difference between

$$\frac{\cdot26+\cdot2\text{ of }3{\cdot}7}{\cdot48-\cdot014\text{ of }20}\quad\text{and}\quad\frac{4{\cdot}\dot{3}+5{\cdot}\dot{6}}{7{\cdot}\dot{4}-\cdot\dot{2}\text{ of }11}.$$

18. Divide 1028·5 by ·0000017, and $\dfrac{2\frac{3}{5}}{3\frac{1}{4}}$ by $\cdot000\dot{6}$; and multiply the difference of the quotients by ·00025.

19. Which of the following vulgar fractions will reduce to terminating, and which to recurring decimals?

(1) $\dfrac{67}{128}$; $\dfrac{66}{129}$; $\dfrac{65}{130}$; $\dfrac{64}{131}$.

(2) $\dfrac{45}{96}$; $\dfrac{47}{98}$; $\dfrac{49}{100}$; $\dfrac{51}{102}$.

20. State which of the following vulgar fractions will reduce to recurring decimals, and what limit there is to the number of figures in the period:

(1) $\frac{28}{37}$; $\frac{27}{36}$; $\frac{28}{35}$; $\frac{27}{33}$.

(2) $\frac{21}{75}$; $\frac{33}{1250}$; $\frac{17}{21}$; $\frac{81}{96}$; $\frac{155}{1147}$.

EXERCISE XXXVII.

PRACTICE.

Find the value of

1. 267 things at 10*s.* each; and 591 things at 5*s.* each.

2. 242 things at 6*s.* 8*d.* each; and 74 things at 15*s.* each.

3. 605 things at 17*s.* 6*d.* each; and 290 things at 6*s.* 6*d.* each.

4. 1256 things at 4*s.* 6*d.* each; and 712 things at 15*s.* 10*d.* each.

5. 73 things at 2*s.* 6½*d.* each; and 2184 things at 3*s.* 8½*d.* each.

6. 328 things at 8*s.* 5½*d.* each; and 250 things at 3*s.* 11½*d.* each.

7. 675 things at £1. 12*s.* 6*d.* each; and 463 things at £1. 8*s.* 9*d.* each.

8. 217 things at £3. 15*s.* each; and 75 things at £4. 13*s.* 4*d.* each.

9. 247 things at £2. 2*s.* 6*d.* each; and 135 things at £3. 2*s.* 9*d.* each.

10. 26 things at £2. 17*s.* 6*d.* each; and 61 things at £12. 9*s.* 3*d.* each.

11. 24 things at £9. 9*s.* 9*d.* each; and 273 things at £3. 15*s.* 4*d.* each.

12. 311 things at £7. 14*s*. 9*d*. each; and 458 things at £9. 8*s*. 7*d*. each.

13. 249 things at £11. 17*s*. 9½*d*. each; and 287 things at £3. 15*s*. 11½*d*. each.

14. 11 things at £1. 14*s*. 9½*d*. each; and 4514 things at £2. 17*s*. 7½*d*. each.

15. 347 things at £48. 7*s*. 4½*d*. each; and 381 things at £8. 18*s*. 5¾*d*. each.

16. 397 things at £3. 17*s*. 10¾*d*. each; and 412 things at £5. 14*s*. 5½*d*. each.

17. 513 things at £1. 9*s*. 7¾*d*. each; and 814 things at £4. 11*s*. 9¼*d*. each.

18. 1569 things at £10. 16*s*. 5¼*d*. each; and 597 things at £24. 10*s*. 9½*d*. each.

19. 325 things at £17. 9*s*. 10½*d*. each; and 46 things at £3. 4*s*. 7¼*d*. each.

20. 235 things at £2. 17*s*. 7¾*d*. each; and 29 things at £2. 15*s*. 3¼*d*. each.

EXERCISE XXXVIII.

PRACTICE.

1. Find the value of 3 cwts. 2 qrs. 14 lbs. at £5. 12*s*. 6*d*. per cwt.

2. Find the value of 3 cwts. 3 qrs. 21 lbs. at £63. 16*s*. 9*d*. per cwt.

3. Find the value of 35 cwts. 3 qrs. 14 lbs. at £1. 19*s*. 6*d*. per cwt.

4. Find the value of 17 cwts. 3 qrs. 21 lbs. at £1. 6*s*. 4*d*. per cwt.

5. Find the value of 5 cwts. 3 qrs. 11 lbs. at £3. 4*s*. 2*d*. per cwt.

6. Find the value of 39 cwts. 3 qrs. 26 lbs. at £4. 17*s*. 10*d*. per cwt.

7. Find the value of 15 cwts. 1 qr. 7 lbs. at £1. 17*s*. 8¼*d*. per cwt.

8. Find the value of 5 cwts. 2 qrs. 10 lbs. at £2. 15*s*. 7*d*. per qr.

9. Find the value of 12 cwts. 2 qrs. 16¼ lbs. at £5. 10*s*. per cwt.

10. Find the value of 3 cwts. 2 qrs. 16 lbs. at £3. 7*s*. 6*d*. per cwt.

11. What would be the rent of a house for 9 mos. 1 wk. 6 d. at £1. 2*s*. 9*d*. a week?

12. What is the cost of 3 cwts. 2 qrs. 17 lbs. of copper at £3. 17*s*. per cwt.?

13. What is the value of 455 Napoleons at 16*s*. 4½*d*. each?

14. What is the value of 2654¾ cwts. of sugar at £3. 15*s*. 9½*d*. per cwt.?

15. What is the value of 3648¾ cwts. of sugar at £4. 14*s*. 6¾*d*. per cwt.?

16. If a person's estate be worth £1384. 16*s*. a year and the land be assessed at 2*s*. 9½*d*. in the pound, what is his clear annual income?

EXERCISE XXXIX.

SQUARE MEASURE.

1. Find the value of 3 yds. 1 ft. × 12 yds. 2 ft.

2. Find the value of 1 ft. 3 in. × 2 ft. 4 in.

3. Find the value of 10 ft. 6 in. × 7 ft. 4 in.

4. Determine the product of 2 yds. 1 ft. 6 in. and 4 yds. 9 in.

5. Determine the product of 3 yds. 1 ft. 6 in. and 5¼ yds.

6. Determine the product of 5 yds. 1 ft. and 3 yds. 6 in.

7. What is the area of the floor of a room whose length is 24 feet, and breadth 19 ft. 6 in.?

8. What is the area of the floor of a room, 25½ ft. by 20 ft.?

9. A box is 2 ft. 6 in. long, and 1 ft. 9 in. wide; find the surface of its lid.

10. Determine the surface of a wall which is 16 feet long, and 3 yds. 2 ft. 3 in. high.

11. Find the area of an enclosure, 17 yds. 1 ft. by 4 yds. 2 ft.

12. What is the surface of a marble-slab, 4½ ft. by 3⅓ ft.?

13. A grass-plot whose area is 96 sq. yards is 27 feet in width; find its length.

14. A room, 31 ft. 4 in. in length, requires 54 sq. yds. 7 sq. ft. 72 sq. in. of carpet to cover its floor; what is its breadth?

15. Find the length of carpet, 2 ft. 4 in. wide, required for a room 52 ft. long by 35 ft. broad.

16. Find the area of the floor of a room 14 ft. 8 in. by 12 ft. 9 in., and the cost of carpeting it at 1*s.* 4*d.* a sq. ft.

17. What is the area of a room 23 ft. 4 in. long by 19 ft. 6 in. broad, and how many yards of carpet 3 ft. 3 in. wide will be required to cover it?

18. Find the difference of the areas of two rooms, one of which is 12 ft. 6 in. by 10 ft. 3 in., and the other 15 ft. 8 in. by 11 ft. 4 in.

19. A room is 36 ft. long, and 12 ft. broad; what will be the difference in the expense of carpeting it with carpet $\frac{3}{4}$ yd. wide at 3*s*. 6*d*. a yard, and with carpet $\frac{7}{8}$ yd. wide at 4*s*. a yard?

20. How many yards of carpet $2\cdot\dot{4}$ ft. wide will cover a room $27\cdot\dot{3}$ ft. long, and $20\cdot1\dot{6}$ feet wide?

21. The length of a rectangular field which contains 14 ac. 2 ro. 30 po., is 907 yards, 1 ft. 6 in.; find its breadth.

22. Find the area of the floor of a square room whose side is 20 feet.

23. One side of a square room is 19½ feet; find the size of its floor, and the expense of carpeting it with carpet 4 ft. 4 in. wide at 3*s*. 6*d*. a yard.

24. How many stones 2 feet long, and 15½ inches wide, would be required to pave a square, whose side is 124 feet?

25. How many square yards are there in the surface of the walls of a room whose length is 22½ feet, breadth 16½ feet, and height 18 feet?

26. A room is 22½ ft. long, 16½ ft. broad, 19½ ft. high; find the area of the floor, and of the walls.

27. Find the area of the walls of a room which is 15 ft. 6 in. long by 13 ft. 4 in. wide, and 10 ft. 6 in. high.

28. A room is 14 ft. long, 12 ft. broad, and 10 ft. high; what will it cost papering at 3½*d*. per square foot?

29. A room is 24 ft. long, 16½ ft. broad, and 18 ft. high.

Find how many yards of paper 4 ft. wide would be required for the walls, and the cost of the same at 6*d*. a yard.

30. A room is 20 ft. long, 16 ft. 6 in. broad, and 12 ft. 6 in. high, find (1) the cost of papering the walls with paper which is 2 ft. 6 in. wide, and which costs 6*d*. a yard; and (2) the cost of carpeting the room at 6*s*. 8*d*. a square yard.

31. A room 27·7 ft. long, 19·55 ft. wide, and 12·4 ft. high, is hung with paper 2·7 ft. wide. Find the cost of the paper at 1·25*s*. per yard.

32. How many square yards are there in the walls of a square room whose side is 20 feet, and height 13½ feet?

33. The walls of a square room whose side is 18 feet, require 104 square yards of paper to cover them; find the height of the room?

34. Find the cost of papering a square room 22½ feet long, and 18 feet high, with paper 2½ feet wide, at 8*d*. a yard.

35. The length of a room is 30 feet, its breadth 19½ feet, and its height 18 feet. It has four windows, each 8 ft. by 4 ft. 6 in., three doors each 7 ft. 6 in. by 4 ft., and two fireplaces each 6 ft. by 4½ ft. Find the expense of papering the room with paper 3 ft. wide at 5*d*. a yard.

36. A room which is 20½ ft. long, 19½ ft. broad, and 12½ ft. high, has in it two windows, each 7½ ft. by 4 ft., one fireplace 4 ft. by 5 ft., and one door 8 ft. by 2½ ft.; what will be the cost of papering it with paper 2½ ft. wide at 4*d*. a yard?

37. What will it cost to cover with lead a cistern whose depth, length, and breadth are 3 ft. 6 in., 7 ft. 10 in., and 5 ft. 4 in., respectively, at 10*s*. 1½*d*. a square yard?

38. A young lady desires to paper her room with postage stamps, but being unable herself to calculate the number which will be required, she supplies the following data: her room is 14 ft. 9 in. long, 9 ft. 3 in. broad, and 10 ft. 6 in. high; it contains two windows, each $5\frac{1}{2}$ ft. by 4 ft., and three doors each 6 ft. by 3 ft.; a postage stamp is $\frac{14}{15}$ of an inch in length, and $\frac{3}{4}$ of an inch in breadth. Make the calculation for her.

39. A room is 57 feet long by 32 feet wide. How many people can be seated in it on chairs which are $1\frac{1}{2}$ feet wide, and placed 2 feet apart from back to back, allowance being made for a clear passage 4 feet wide down the middle of the room, and for a clear space 12 feet deep at the end?

40. A rectangular piece of ground is 32 feet long, and 23 feet broad. Find the cost of enclosing it with a path 4 feet broad, at a price of 2*s.* a square yard; (1) when the path is outside the piece of ground, (2) when the path is part of the ground.

EXERCISE XL.

Cubic Measure.

1. Find the value of 3 yds. 1 ft. × 2 yds. 2 ft. × 9 yds.
2. Find the value of
   3 yds. 1 ft. 6 in. × 2 ft. 3 in. × 5 yds. 1 ft.
3. Find the value of 5 yds. 1 ft. × 3 yds. 2 ft. 3 in. × 9 in.
4. Find the value of $7\frac{1}{2}$ ft. × $2\frac{3}{8}$ ft. × 8 ft.

5. What is the solid content of a block of marble whose length is 5 ft. 4 in., breadth 2 ft. 3 in., and thickness 4 ft. 6 in.?

6. The length of a box is 9 ft., its breadth 5½ ft., its depth 4 ft. How many cubic yards does it contain?

7. A cubic foot of water weighing 1000 oz., find the weight of water in a vessel 6 feet long, 4½ ft. wide, and 4 ft. deep.

8. The length of a square tank is 20 feet, and its depth 13½ feet; find the number of cubic yards it contains.

9. The length of a tank is 18 ft., its breadth 15 ft., and its content is 90 cubic yards. What is its depth?

10. The length of a box is 30 inches, its depth 18 inches, and it contains 4 cub. ft. 1188 in. What is its breadth?

11. What is the depth of a square box which is 3 ft. 9 in. long, and contains 37 cub. ft. 864 in.?

12. If in the formation of a square tank 22½ ft. in length, 225 cubic yards of earth were dug out, what was the depth of the tank?

13. Given that the solid content of a square box is 792 inches, and that its depth is 5½ inches; find its length.

14. The area of the Yorkshire coal-field is 937½ square miles, and the average thickness of the coal is 70 feet. If a cubic yard of coal weigh one ton, and the annual consumption of coal in Great Britain be 70,000,000 tons, find the number of years for which this coal-field alone would supply Great Britain with coal at the present rate of consumption.

15. Supposing the average fall of rain in England to have been in a given year 27 inches, find how high this

quantity of water would fill a tank a mile square, the area of England being estimated at 57812 sq. miles.

16. Sixty thousand bricks are required for a wall 50 yards long, 15 feet high, and 1 ft. $10\frac{1}{2}$ in. thick. Knowing each brick to be 9 in. long, and $4\frac{1}{2}$ in. wide, find its thickness.

EXERCISE XLI.

Proportion.

1. Find the fourth term, when the following are the first three terms of a proportion:

2, 3, 8 ; 4, 5, 12 ; 4, 5, 10 ;
$3\frac{1}{2}$, $5\frac{1}{4}$, 1 ; $3\frac{1}{5}$, $6\frac{2}{3}$, 9 ; 2·5, 3, 1·75.

2. Find the third term, when the following are the other three terms of a proportion:

5, 3, 9 ; 4, 6, 12 ; 2, 1, 11 ;
$7\frac{1}{2}$, 25, 20 ; $2\frac{1}{2}$, 14, $2\frac{1}{3}$; $3{\cdot}\dot{5}$, $2{\cdot}\dot{4}$, 11.

3. Find the second term, when the following are the other three terms of a proportion:

1, 2, 4 ; 12, 8, 2 ; 6, 8, 10 ;
$2\frac{1}{5}$, 11, 5 ; $6\frac{1}{4}$, $3\frac{3}{4}$, 2 ; 18, $2{\cdot}\dot{6}$, $1{\cdot}\dot{8}$.

4. Find the first term, when the following are the last three terms of a proportion:

2, 6, 4 ; 3, 2, 12 ; 9, 8, 12 ;
$5\frac{1}{3}$, $6\frac{1}{8}$, $6\frac{2}{9}$; $7\frac{1}{3}$, $2\frac{2}{5}$, $1\frac{1}{10}$; $2{\cdot}\dot{5}$, 5·25, $4{\cdot}\dot{6}$.

5. Find the remaining terms, when the following are any three terms of a proportion:

6, 10, 15 ; 4, 8, 16 ; 5, 10, 25.

6. Determine which of the following sets of terms are proportionals:

$2, 5, 4, 9$; $8, 7, 5, 12$; $4, 3, 12, 9$;

$9, 7, 8, 6$; $2\frac{1}{2}, 3\frac{1}{5}, 10, 12\frac{4}{5}$; $7\frac{1}{9}, 13\frac{1}{3}, 1\frac{1}{2}, 2\frac{1}{4}$;

$4{\cdot}5, 3{\cdot}2, 8{\cdot}75, 6{\cdot}\dot{2}$; $2{\cdot}\dot{3}, {\cdot}\dot{4}, 1, {\cdot}\dot{1}\dot{6}$.

EXERCISE XLII.

RULE OF THREE.

1. If 12 lbs. of coffee cost £1, what will 30 lbs. cost?

2. If 27 tons of iron cost £54. 4*s*. 6*d*., what will 31 tons cost?

3. If 17 bushels of wheat are sold for £25. 10*s*., what should be given for 43 bushels.?

4. What is the value of 5 dozen of wine when 3 dozen of it sell for £6. 15*s*.?

5. If 100 bushels of wheat be sold for £127. 10*s*., find the price of 36 bushels.

6. If 36 gallons of wine cost £29. 10*s*., what is the price of 21 gallons of the same wine?

7. If I pay 10 shillings for travelling 40 miles, what should my fare be for 124 miles?

8. If 32 acres of land are rented for £40, what should be the rent of 56 acres?

9. Find the price of 25½ lbs. of tea, when 17 lbs. of it cost £3. 17*s*. 6*d*.

10. If 3 qrs. 23 lbs. 13 oz. are sold for £1. 0*s*. 10*d*., how much will 7 cwt. 2 qrs. 26 lbs. 13 oz. cost?

11. What is the annual expense of the horses of a

cavalry regiment 750 in number, when one horse can be kept for 12*s.* a week?

12. Find the value of 44 things at £23 for every 40.

13. Find the value of 23 things at £16. 10*s.* for every 11.

14. Find the value of 21 things at £21 for every 20.

15. Find the value of 17 things at £19. 10*s.* for every 13.

16. What is the value of 95 tons 17 cwt. of coals at £1. 15*s.* per load of 1¾ tons?

17. What is the value of 132 quarters of wheat at 15*s.* per coomb of 3 bushels?

18. If 3 lbs. of tea cost 12*s.* 6*d.*, how many lbs. can be bought for £12. 10*s.*?

19. If £6. 14*s.* 2*d.* be paid for 2 cwt. 3 qrs. 14 lbs. of sugar, what quantity can be bought for £29. 15*s.*?

20. If the carriage of 6 cwt. 3 qrs. for 124 miles cost £3. 4*s.* 8*d.*, what weight can be carried the same distance for £1. 4*s.* 3*d.*?

21. How many dinners can be provided for £33. 12*s.* 1½*d.* if 327 cost £12. 18*s.* 10½*d.*?

22. A man receives 17*s.* 6*d.* for 5 days' work, what will he make in a year, excluding the 52 Sundays?

23. What difference would it make in the above if the first day of the year was a Sunday?

24. What is the value of $\frac{3}{11}$ of an estate, when $\frac{2}{3}$ of it can be bought for £2200?

25. If $\frac{1}{8}$ of a ship cost £73. 1*s*. 3*d*., what part of her is worth £250. 10*s*.?

26. Reduce 3 days 5 hrs. 4 min. to seconds; and find how many beats a clock makes in this time if it beats 31 times in 30″.

27. If 12 men can do a piece of work in 20 days, in how many days will 15 men do it?

28. In how many days will 24 men do a piece of work, which can be done by 14 men in 18 days?

29. If a train which travels 45½ miles an hour goes from London to Edinburgh in 8½ hours, what time will be taken by a train which travels 39⅔ miles an hour?

30. A boat's crew row down from Searle's boat-house at Cambridge to the locks at Baitsbite in half an hour, and they row back in ¾ hr. If they are 7½ hrs. in rowing to Ely and back, how long were they in going down?

31. A man contracts to perform a piece of work in 60 days, and immediately employs upon it 30 men; at the end of 48 days the work is only half done: required the additional number of men necessary to fulfil the contract.

32. A bankrupt who is paying 7*s*. 6*d*. in the £, divides among his creditors £1575; what do his debts amount to?

EXERCISE XLIII.

Double Rule of Three.

1. The expense of housekeeping for a family of 9 persons for 8 months is £120. How much would a family of 24 persons require for 16 months at the same rate for each of them?

2. If 16 men can reap 76 acres in 4 days, how many men will reap 114 acres in 6 days?

3. If 24 men can reap 76 acres in 6 days, in how many days will 114 acres be reaped by 18 men?

4. How many acres can 16 men reap in 3 days, if 7 men can reap 126 acres in 12 days?

5. If 10 men in 8 days dig 30 cubic yards of earth, how many yards can be dug by 20 men in 10 days?

6. If 1050 soldiers consume 250 quarters of corn in 6 months, how many soldiers will 960 quarters serve for 4 months?

7. If 6 men can weed 4 acres in 2 days, how many men would be required to weed 7 acres in 3 days?

8. If a garrison of 600 men have provisions for 5 weeks, allowing each man 12 oz. a day, how many men can be maintained 10 weeks upon the same quantity if each man is limited to 8 oz. a day?

9. How far ought 4¾ cwt. to be carried for 11*s.* 10½*d.*, when the carriage of 17½ cwt. for 52 miles comes to 8*s.* 4*d.*?

10. Find how many lbs. of worsted would make a piece of stuff 100 yards long and 2¼ yds. broad, when 2 lbs. make 12 yds. of stuff of 1½ yds. in breadth.

11. If the carriage of 18 cwt. for 32 miles come to 6*s.* 6*d.*, how far ought 72 cwt. to be carried for 14*s.* 1*d.*?

12. If 12 horses eat 48 bushels of oats in 20 days, how many bushels will 30 horses eat in 16 days?

13. If 10 men are supplied with bread for 12¼ days for 10*s.* 6*d.*, for how much can 15 men be supplied for 7 days at the same rate?

14. What time would 36 men, working 10½ hours a day, require to build a wall which 24 men, working 9 hours 20 min. a day, can build in 9 days?

15. How many revolutions will be made by a wheel which revolves at the rate of 360 revolutions in 7 minutes, while another wheel, which revolves at the rate of 470 in 8 minutes, makes 658 revolutions?

16. If I borrow £500 for 13 months when money is worth 4½ per cent., how much ought I to lend in return for 15 months when money is worth 3¼ per cent.?

17. Three men working 8 hours a day can reap 15 acres in 8 days; how many men working 12 hours a day can reap 30 acres in 4 days?

18. If 7 men mow 84 acres in 12 days of 8¼ hours each, how many hours a day would 20 men have to work to mow 208 acres in 11 days?

19. If 7 men, working 16 days, can mow a field 1320 yards long, and half-a-mile wide, what will be the length of a field 1320 yards wide, which 4 men can mow in 42 days?

20. Fifteen horses having 4 feeds a day can be kept for 2 months for 16 guineas, what will be the cost of keeping 20 mules for 5 months, giving them 3 feeds a day, a horse's feed being $\frac{5}{6}$ of a mule's.

21. Twenty men can perform a piece of work in 12 days; find how many men will perform a piece of work half as large again in a fifth part of the time, supposing that they work the same number of hours in the day, but that two of the second set can do as much work in an hour as three of the first set.

22. If 132 men can dig a trench, 100 yds. long, 3 yds. deep, and 2 yds. wide in 7 days, working 10 hours a day; how many men will be required to dig a trench 320 yds. long, 4 yds. deep, and 3 yds. wide, in 11 days, working 12 hours each day?

23. If 10 men reap 4 acres of corn in 4 days, working 10 hours a day; how many men would be required to reap 21 acres in 12 days, working 12 hours a day; supposing that a reaper who works 10 hours a day does $\frac{1}{35}$th more work in an hour than one who works 12 hours a day?

24. A piece of work is to be done in 36 days: 15 men work at it 15 hours a day, but after 24 days only $\frac{3}{5}$ of it is done; if 3 more men are put on, how many hours a day must all work to finish it in the given time?

EXERCISE XLIV.

SIMPLE INTEREST.

1. Find the simple interest upon

(1) £556. 15*s*. 10*d*. for 5 years at 4 per cent.

(2) £550. 10*s*. for 2 years at 5 per cent.

(3) £217. 17*s*. 8½*d*. for 4 years at 5 per cent.

(4) £12. 17*s*. 6*d*. for 1 year at 5 per cent.

(5) £2254. 17*s*. 1*d*. for 2½ years at 4 per cent.

(6) £450. 6*s*. 8*d*. for 2½ years at 6 per cent.

(7) £7584. 7*s*. 11*d*. for 3⅓ years at 6 per cent.

(8) £975. 5*s*. 5*d*. for 3 years at 3⅓ per cent.

(9) £254. 12*s*. 6*d*. for 2 years and 6 months at 4 per cent.

(10) £450. 12*s*. 6*d*. for 2 years and 6 months at 8 per cent.

(11) £375. 6*s*. 8*d*. for 3 years and 9 months at 6 per cent.

(12) £1250 for 4 years at 3⅔ per cent.

2. Find the amount, at simple interest, of

(1) £725 for 11½ years at 3 per cent.

(2) £574. 11*s*. 3*d*. for 6 years at 3⅓ per cent.

(3) £566. 13*s*. 4*d*. for 2½ years at 6 per cent.

(4) £1127. 18*s*. 4*d*. for 1½ years at 3 per cent.

(5) £78. 17*s*. 6*d*. for 3 years and 4 months at 3 per cent.

(6) £1200 for 3 years and 7 months at 5½ per cent.

(7) £356. 6*s*. 8*d*. for 4½ years at 3⅓ per cent.

(8) £953. 10*s*. for 2½ years at 3⅓ per cent.

(9) £148. 12*s*. 6*d*. for 5 years at 1⅔ per cent.

(10) £2475. 8*s*. 4*d*. for 3 months at 4 per cent.

(11) £285. 10*s*. for 8 years at 4 per cent.

(12) £16. 9*s*. 8*d*. for 1 year at 8½ per cent.

3. If I put out to interest £753. 6*s*. 8*d*. for 8 years at 3⅓ per cent. per annum, what interest shall I receive?

4. If I put out to interest £212. 7*s*. 6*d*. for 3 years and 6 months at 4 per cent. per annum, what will be the whole amount I shall receive back?

5. Find the amount at simple interest of £994. 15*s*. 2*d*. for 6 years and 8 months at 6 per cent. per annum.

6. Which is the better interest, 5 per cent. payable quarterly, or 5⅛ per cent. payable yearly?

7. What is the interest upon £486. 13*s.* 4*d.* for 150 days, at 4 per cent. per annum?

8. What is the interest upon £7300 from June 1 to Aug. 5 at 4 per cent. per annum*?

9. What sum of money should be paid for the loan of £1127. 2*s.* from Feb. 20 to May 4, interest being reckoned at 10 per cent. per annum?

10. Find the interest upon £7176. 9*s.* 5*d.* from July 10 to Dec. 3, at 2½ per cent. per annum.

11. Find the interest upon £2512. 10*s.* from June 3, 1863 to Aug. 15, 1864, at 6⅝ per cent. per annum.

12. Find the interest upon £250. 13*s.* 4*d.*, put out to interest from July 1, 1864 to Jan. 1, 1867, at 4¾ per cent. per annum.

EXERCISE XLV.

Compound Interest.

1. Find the compound interest upon

(1) £2500 for 2 years at 4 per cent. per annum.

(2) £1500 for 2 years at 5 per cent. per annum.

(3) £210. 16*s.* 8*d.* for 2 years at 3 per cent. per annum.

(4) £195. 6*s.* 3*d.* for 3 years at 6 per cent. per annum.

2. Find the amount, at compound interest, of

(1) £200 for 3 years at 5 per cent. per annum.

(2) £672. 10*s.* for 2 years at 4 per cent. per annum.

(3) £666. 13*s.* 4*d.* for 3 years at 3 per cent. per annum.

(4) £8975 for 3 years at 4 per cent. per annum.

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* In this and similar questions one of the given days is to be included.

3. Find the compound interest upon

(1) £4000 for 2½ years at 5 per cent. per annum.

(2) £11000 for 2½ years at 5 per cent. per annum.

(3) £666. 13*s*. 4*d*. for 2½ years at 6 per cent. per annum.

(4) £5250 for 2⅓ years at 4 per cent. per annum.

(5) £734. 6*s*. 8*d*. for 2½ years at 6 per cent. per annum.

(6) £2500 for 2⅔ years at 4½ per cent. per annum.

4. Find the amount, at compound interest, of

(1) £6000 for 2½ years at 5 per cent. per annum.

(2) £2000 for 2½ years at 4 per cent. per annum.

(3) £785 for 2⅓ years at 3 per cent. per annum.

(4) £350. 6*s*. 8*d*. for 2⅓ years at 6 per cent. per annum.

(5) £5650 for 2⅔ years at 4 per cent. per annum.

(6) £666. 13*s*. 4*d*. for 2½ years at 3 per cent. per annum.

5. Find the difference between the simple and compound interest upon £1000 for 2 years at 7½ per cent. per annum.

6. Find the difference between the simple and compound interest upon £500 for 3 years at 5 per cent. per annum.

7. What is the difference between the simple and compound interest upon £1375 at 5 per cent. per annum for 2 years and 4 months?

8. Find the compound interest on £16000 for 2 years at 5 per cent. per annum; interest being payable half-yearly.

EXERCISE XLVI.

SIMPLE INTEREST.

1. In what time will the interest upon £1275 become £178. 10*s.* at 4 per cent. per ann.?

2. In what time will £750 produce an interest of £82. 10*s.* at $2\frac{1}{2}$ per cent. per ann.?

3. In what time will the interest upon £572. 6*s.* 8*d.* amount to £68. 13*s.* $7\frac{1}{5}$*d.* at 3 per cent. per ann.?

4. In what time will the interest upon £1275. 17*s.* 6*d.* amount to £204. 2*s.* $9\frac{3}{5}$*d.* at 5 per cent. per ann.?

5. In what time will £833. 6*s.* 8*d.* amount to £1045. 16*s.* 8*d.* at $4\frac{1}{2}$ per cent. per ann.?

6. In what time will £572. 6*s.* 8*d.* amount to £641. 0*s.* $3\frac{1}{5}$*d* at 3 per cent. per ann.?

7. At what rate of annual interest will the interest upon £750 amount to £150 in 6 years?

8. At what rate of annual interest will the interest upon £755. 12*s.* 6*d.* amount to £130. 2*s.* $8\frac{1}{2}$*d.* in $3\frac{1}{3}$ years?

9. If £1287. 10*s.* is put out at interest for $5\frac{1}{4}$ years, what rate of annual interest must be charged upon it so that it may produce £236. 11*s.* $6\frac{3}{4}$*d.*?

10. £600 having been out at interest for 5 years has become £678, what has been the rate of annual interest?

11. If I pay £14648. 8*s.* 9*d.* *now* for a debt of £16992. 3*s.* 9*d.* due 4 years hence, what is the rate of interest?

12. If £1800 is put out at interest for $2\frac{1}{2}$ years, and at the end of that time has become £2040, what is the rate of interest?

13. What sum of money put out at interest at 4 per cent. per ann. will become £550 in 2½ years?

14. What principal will amount to £226. 2*s.* 8*d.* in a year and a half at 4 per cent. per ann.?

15. What principal will amount to £1046. 3*s.* in 4 years at 5½ per cent. per ann.?

16. What sum put out at interest at 2½ per cent. per annum will produce £52. 10*s.* in 4 years?

17. Two years and a half hence I have to pay a bill of £1207. 17*s.* 8*d.*; what sum of money must I now put out at interest at 6 per cent. per annum, that with it I may be able to pay the bill on its becoming due?

18. What principal will produce £104. 12*s.* 2⅜*d.* in 5½ years at 4 per cent. per annum?

19. In what time will £229. 10*s.* amount to £258. 3*s.* 9*d.* at 5 per cent. per annum?

20. At what rate of annual interest will £550 produce £82. 10*s.* in 4½ years?

21. What sum of money put out at interest for 6 yrs. 8 months will amount to £226. 13*s.* 4*d.* at 4⅛ per cent. per annum?

22. £1950 was put out at interest for 3 yrs. 4 mos., and produced £325. What was the rate of interest per annum?

23. What principal will amount to £1600. 7*s.* in 3 years at 4½ per cent. per annum?

24. For how many years must £344. 15*s.* be put out at interest at 5 per cent. per ann., that it may produce £120. 13*s.* 3*d.*?

25. At what rate of annual interest will £205 become £225. 10*s*. in 3$\frac{1}{3}$ years?

26. In what time will £158. 6*s*. 8*d*. amount to £176. 14*s*. 8*d*. at 3 per cent. per annum?

27. What sum will become £67. 12*s*. in 6 years at 5$\frac{1}{3}$ per cent. per annum?

28. At what rate per cent. will £738 amount to £798. 5*s*. 4$\frac{4}{5}$*d*. in 3$\frac{1}{2}$ years?

29. What principal will produce £28. 11*s*. 11$\frac{3}{4}$*d*. in 2$\frac{2}{3}$ years at 7$\frac{1}{2}$ per cent. per annum?

30. In what time will the interest on £420 amount to £80. 10*s*. at 3$\frac{1}{3}$ per cent. per annum?

EXERCISE XLVII.

PRESENT VALUE AND DISCOUNT.

1. Find the present value of

(1) £1320 due 4 years hence at 5 per cent. per annum.

(2) £805. 19*s*. 2*d*. due 5 years hence at 3 per cent. per annum.

(3) £994. 15*s*. 2*d*. due 6$\frac{2}{3}$ years hence at 6 per cent per annum.

(4) £128. 2*s*. due 4 years hence at 5$\frac{1}{2}$ per cent. per annum.

(5) £637. 10*s*. due 5$\frac{1}{2}$ years hence at 5 per cent. per annum.

(6) £191. 14*s*. 10*d*. due 3 years hence at 5$\frac{1}{6}$ per cent. per annum.

2. Find the true discount upon

(1) £1224. 12*s.* due 5 years hence at 4 per cent. per annum.

(2) £1165. 16*s.* 3*d.* due 2½ years hence at 6 per cent. per annum.

(3) £832. 7*s.* 10*d.* due 4 years hence at 4½ per cent. per annum.

(4) £666. 10*s.* due 6 years hence at 3⅓ per cent. per annum.

(5) £994. 15*s.* 2*d.* due 6⅔ years hence at 6 per cent. per annum.

(6) £1110. 12*s.* 8*d.* due 1½ year hence at 6⅔ per cent. per annum.

3. Find the present worth of a bill for

(1) £1127. 2*s.* drawn Jan. 1 at 4 months, and discounted Feb. 20, at 10 per cent. per annum.

(2) £107. 10*s.* 6*d.* drawn Jan. 15 at 4 months, and discounted March 6, at 10 per cent. per annum.

(3) £1242. 0*s.* 2*d.* drawn June 7 at 11 months, and discounted Dec. 15, at 7½ per cent. per annum.

(4) £352. 11*s.* 9*d.* drawn March 22 at 7 months, and discounted Aug. 13, at 2½ per cent. per annum.

(5) £1227. 11*s.* 5*d.* drawn June 6 at 11 months, and discounted March 30, at 9⅛ per cent. per annum.

(6) £600 drawn Sept. 1 at 9 months, and discounted March 23, at 6¼ per cent. per annum.

4. Find the true discount on a bill for

(1) £1217. 9*s.* 5*d.* drawn Jan. 11 at 8 months, and discounted July 3, at 5 per cent. per annum.

(2) £7176. 9*s.* 5*d.* drawn Jan. 1 at 11 months, and discounted July 11, at $2\frac{1}{2}$ per cent. per annum.

(3) £416. 11*s.* $5\frac{1}{2}$*d.* drawn May 1 at 4 months, and discounted June 23, at $7\frac{1}{2}$ per cent. per annum

(4) £1256. 6*s.* $10\frac{1}{2}$*d.* drawn July 8 at 11 months, and discounted March 30, at $6\frac{1}{4}$ per cent. per annum.

(5) £652. 11*s.* 9*d.* drawn March 22 at 7 months, and discounted Aug. 13, at $2\frac{1}{2}$ per cent. per annum.

(6) £715. 5*s.* 6*d.* drawn Dec. 15 at 10 months, and discounted May 25, at 10 per cent. per annum.

5. What is the present value of a bill for £631. 5*s.*, which has 4 months to run, and is discounted at 3 per cent. per annum?

6. A bill due 3 months hence is discounted at 4 per cent. per annum, and its present value is £1225. What is the amount of the bill?

7. What is the discount on £328. 13*s.* 5*d.* due 3 months hence at 4 per cent. per annum?

8. Find the present value of £415. 8*s.* 8*d.* due 9 months hence, allowing 4 per cent. per annum interest.

9. What is the present worth of £396. 10*s.* 6*d.* due 11 months hence, interest being reckoned at 4 per cent. per annum?

10. Find the discount on £428. 15*s.* due 5 months hence at 5 per cent. per annum.

11. What is the discount on £399. 1*s.* 6*d.* due 13 months hence, interest being reckoned at 5 per cent. per annum?

12. A bill for £202. 8*s.* which was legally due on June 30, was paid on April 18. Find the discount to be

deducted, interest being paid at the rate of 6 per cent. per annum.

13. A bill, payable on demand, for £56. 3*s.* 7½*d.* is drawn on Sept. 11 at 10 months' date, and is discounted on Feb. 15 at 2½ per cent. per annum. Find the sum paid.

14. Find the sum deducted from a bill for £634. 13*s.* 6*d.* nominally due on June 9, 1866, and discounted on March 31, 1865, at 5 per cent. per annum.

15. What is the present value of a bill for £2040 drawn on Jan. 3, at 7 months, and discounted on May 25, at 10 per cent. per annum?

EXERCISE XLVIII.

PROPORTIONAL PARTS, PARTNERSHIP, AND EQUATION OF PAYMENTS.

1. Divide 570 in the proportion of 2, 3, and 5; and 2544 in the proportion of 7, 8, and 9.

2. Distribute £3500 among three persons in the proportion of 5, 9, and 16.

3. Divide £381. 2*s.* 2*d.* in the proportion of 3, 4, and 12.

4. Divide 250 in the ratio of the first four natural numbers.

5. Apportion £450 to three persons in the ratio of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{6}$.

6. Divide 92 in the proportion of $\frac{2}{3} : \frac{4}{5} : \frac{5}{6}$.

7. *A*, *B*, *C* invest in a business concern £700, £1100,

and £1200 respectively; what share should each have of the profits which amounted to £1500?

8. Three persons put into a business concern £450, £350, and £550 respectively; divide among them a profit of £337. 10*s*.

9. A bankrupt owes one creditor £1072, each of three others £355, and two others the several sums of £385. 10*s*. and 150 guineas; his assets are £1000. What will the first-mentioned creditor receive for his dividend?

10. Divide £404. 8*s*. 2*d*. among three persons, so that the first shall have twice as much as the second, and the second four times as much as the third.

11. Divide £500 among four persons, so that the first shall have twice as much as the second, the second twice as much as the third, and the third twice as much as the fourth.

12. Divide £3800 among *A*, *B*, and *C*, so that *A* shall have twice as much as *B*, and *C* shall have one-sixth of *B*'s share.

13. Divide £1296 among *A*, *B*, and *C*, so that *B* shall have three times as much as *A*, and *C* half as much as *A* and *B* together.

14. Water is composed of two gases, oxygen and hydrogen, in the proportion of 88·9 to 11·1; what weight of each is there in a cubic yard of water, it being given that a cubic foot of water weighs 1000 oz.?

15. Gunpowder is composed of nitre, charcoal, and sulphur in the proportion of 15, 3, and 2. Find what weight of gunpowder would correspond to 22½ cwts. of nitre, and find also the corresponding weights of charcoal and sulphur.

16. Divide £13. 5*s.* 7½*d.* among 3 men and 2 boys, so that each boy shall have one-third of a man's share.

17. Divide £42. 19*s.* 8¼*d.* among 6 men and 3 women, so that each woman shall receive one-seventh of a man's share.

18. Divide £175 among 4 men, 5 women, and 6 children, so that each man shall have thrice as much as a woman, and each woman twice as much as a child.

19. Divide £877. 14*s.* 2*d.* among 5 men, 7 women, and 16 children, so that a man shall have twice a woman's share, and a woman twice a child's share.

20. *A* and *B* join in business, *A* investing £7000 for 12 months, and *B* £5000 for 18 months. What share should each have in a profit of £872. 18*s.*?

21. *A*, *B*, and *C* join in an investment. *A* puts in £1000, *B* £750, and *C* £2000. At the end of 6 months, *A* adds £500, and *B* £300 to their respective investments. In what proportion should £996, the gain of a year, be divided?

22. *A*, *B*, and *C* invest capital in a concern in the following proportion: *A* invests £5000; *B* invests £4000 and at the end of 6 months adds £1000 to it; *C* invests £6000 but at the end of 4 months withdraws £1500. Divide equitably between them £2610, the profits of a year.

23. *A* and *B* invest capital in the proportion of 7 to 8. After 5 months *A* takes away one-half of his, and *B* two-thirds of his. At the end of a year they have gained £1772. 10*s.*; what share of this should fall to each?

24. *A* puts into a business one-half of what *B* does: after 4 months *B* takes out two-thirds of his share, but at the end of four months puts back again one-fourth of what

he had taken out. Divide between them 1000 guineas, the profits of the year.

25. A tradesman ought to receive from a customer £50 at the end of 2 months, £30 at the end of 4 months, and £20 at the end of 6½ months. What would be the proper time for receiving the whole sum together?

26. One-third of a debt is due in 3 months, one-fourth of it in 4 months, and the remainder in 6 months. Find the equated time for the payment of the whole.

27. Of a debt of £1000, £190 is due now, £250 at the end of a month, £370 at the end of 5 months, £120 at the end of 8½ months, and the rest at the end of 9 months. When would be the proper time of payment, if the whole debt were paid at once?

28. A person has 200 coins consisting of guineas, half-sovereigns, and half-crowns; the sums of money in guineas, half-sovereigns, and half-crowns are as 14 : 8 : 3; find the number of the different coins.

29. If 20 men, 40 women, and 50 children receive £350 amongst them for 7 weeks' work, and 2 men receive as much as 3 women or 5 children, what sum does a woman receive for a week's work?

30. If 3 men do as much work as 5 women, and 2 women as 5 children, divide between 9 men, 11 women, and 6 children a day's wage amounting altogether to £3. 5*s.* 1*d.*

31. The sum of £600 is to be divided among 24 men, 36 women, and 72 children, so that the shares of 2 men shall be equal to those of 3 women, and each woman's share to the share of 2 children; what will be the share of each?

32. A sum of £1000 is to be divided between 10 men,

32 women, and 48 children; if each man's share is to be equal to the share of 2 women, and if the 32 women are to have twice as much as the 48 children, how much will the several individuals receive?

33. *A* and *B* contract to execute a certain order for £1245. *A* employs 180 children for 3 months, 80 women for 2 months, and 40 men for 1 month: *B* employs 120 children for 2 months, 60 women for 1½ month, and 80 men for 2½ month. If the work done by a child, a woman, and a man be in the ratio of 1 : 2 : 3, find the money which *A* and *B* must each receive.

34. *A* and *B* rent a field for £60. *A* puts in 10 horses for 1½ month, 30 oxen for 2 months, and 100 sheep for 3¼ months: *B* puts in 20 horses for 1 month, 40 oxen for 1½ month, and 200 sheep for 4 months. If the food consumed by a horse, an ox, and a sheep be in the ratio of 3 : 2 : 1, find the portion of the rent of the field which each must pay.

35. The sum of £177 is to be divided among 15 men, 20 women, and 30 children, in such a manner that a man and a child shall together receive as much as 2 women, and all the women shall together receive £60: what will they respectively receive?

EXERCISE XLIX.

PROFIT AND LOSS.

1. If a house be bought for £2500 and afterwards sold for £2750, what is the gain per cent.?

2. Sugar which had been bought at 7½*d.* a lb. was sold at 6½*d.* a lb.; what did the grocer lose per cent.?

3. A knife which cost 3*s.* 6*d.* is sold for 3*s.* 10½*d.*; what is the profit per cent.?

4. If wine be bought at 7*s.* 6*d.* a gallon, and sold at 10*s.* a gallon, what is the wine merchant's gain per cent.?

5. Tea bought at 3*s.* 9*d.* a lb. is sold at a gain of 20 per cent.; find the selling price.

6. What must an estate which cost £25000 be sold for so as to produce a gain of 7½ per cent.?

7. A railway company having bought a branch line for £32500, had to sell it again at a loss of 15 per cent., what did they receive for it?

8. Coals are raised at the rate of 12*s.* 6*d.* a ton, and the cost of their transit is 24 per cent. on this cost of raising them. How should they be sold so as to bring in a profit of 25 per cent.?

9. Coffee retailed at the rate of 1*s.* 10*d.* a lb. produces a gain of 10 per cent. on the prime cost. What was the prime cost?

10. Find the prime cost of an article which is sold by its owner, at a loss of 7½ per cent., for £3. 14*s.*

11. A vessel which was sold for £2700 brought thereby a gain of 12½ per cent. to its builders. What had been the cost of building it?

12. By selling tea at 3*s.* 8*d.* a lb., a tradesman gains 10 per cent., how must he sell it so as to gain 15 per cent.?

13. A bookseller, by selling a book for 5*s.* 2*d.* gains 24 per cent., what must he sell it for if he is to gain 10 per cent.?

14. If by selling an estate for £2508 I lose 10 per cent., for what must I sell it so that I may gain 5 per cent.?

15. If I gain $7\frac{1}{2}$ per cent. by selling a horse for £64. 10*s.*, for what must he be sold if I am to lose 10 per cent.?

16. If 5 per cent. would be gained by selling tea at 5*s.* 3*d.* a lb., what would be the gain or loss per cent. if it were sold at 4*s.* 9*d.* a lb.?

17. What percentage is gained by selling an article for 11*s.* 6*d.*, when 5 per cent. is lost by selling it for 9*s.* 6*d.*?

18. If 6 per cent. is gained by selling a horse for £371, how much per cent. is lost by selling him for £343?

19. What percentage is lost by selling a carriage for £40, when $7\frac{1}{2}$ per cent. would have been gained if it had been sold for £50?

20. An article which costs 7*s.*, and another which costs 11*s.*, are together sold for £1. 4*s.* 9*d.*, what is the profit per cent.?

21. A wine merchant buys 12 dozen of port at 84*s.* per dozen and 60 dozen more at 48*s.* per dozen; he mixes them and sells the mixture at 72*s.* per dozen; what profit per cent. does he realize on his original outlay?

22. If different kinds of tea worth 3*s.* 9*d.*, 4*s.* 6*d.* 4*s.* 9*d.* a lb. respectively be mixed, and the mixture be sold at 5*s.* 5*d.* a lb., find the gain per cent.

23. If 3 kinds of sugar, worth 6*d.*, $6\frac{1}{2}$*d.*, and $7\frac{1}{2}$*d.* per lb. respectively be mixed and the mixture sold for 6*d.* per lb., what was the loss per cent.?

24. Coffee costing 1*s.* 7*d.* a lb. is mixed with chicory worth 4*d.* a lb. in the proportion of 4 to 1, and the mixture is sold at 1*s.* 8*d.* a lb.; find the gain per cent.

25. A woman buys a certain number of apples at 3 a penny, and the same number at 2 a penny; she then mixes them together and sells them at 5 for twopence. How much does she gain or lose per cent. by the transaction?

26. If apples are bought for 4 a penny, and mixed with an equal number bought for 3 a penny, and then sold at 5 for 2*d.*, find the gain per cent.

27. A man buys the produce of some fields, calculated at 100 quarters of wheat, at 57*s.* a quarter. The yield proving deficient, he sold the wheat at 72*s.* a quarter and thereby cleared 2 per cent. How many quarters did the fields produce?

28. A business is started by three men with equal capitals; one of them, being manager, is to receive 16 per cent. on the total profits before the dividends are paid. If the manager received altogether £451, what were the total profits of the concern?

29. *A* sells goods to *B* at a loss of 4 per cent., *B* sells them to *C* at a loss of 6¼ per cent., *C* sells them to *D* for £24. 8*s.* 3*d.* If *C* gains 8½ per cent., what was the prime cost of the goods?

30. A grocer bought a stock of tea intending to gain 8 per cent. by its sale. When he had sold two-thirds of it, he was compelled to reduce the price 6*d.* per lb., and so gained only half as much as he had intended. What was the original cost, per lb., of the tea?

EXERCISE L.

STOCKS.

1. What income is derived from holding stock to the amount of £4375 in the 5⅓ per cents. at 97?

2. Find the income derived from the possession of £5250 stock in the 3⅕ per cents. at 89.

3. I wish to purchase £5000 stock in the 4 per cents. at 92½, what will it cost me, and what income shall I derive from it?

4. What is the sterling value of £1850 in the 4 per cents. at 91⅓, and what income does it produce?

5. How many bonds in the 3⅓ per cents. at 70 must be bought to produce an annual income of £550?

6. Find what amount of stock money in the 4⅜ per cents. at 92 will produce £1400 a year.

7. An income of £348. 10*s.* is to be derived from the 4¼ per cents. at 95, how much stock will it be necessary to purchase?

8. How many bonds must I buy, in order that I may derive an income of £640 from the 5⅓ per cents. at 105?

9. What is the percentage on each bond, when the possessor of 225 bonds derives from them an income of £720?

10. £850 a year is the income derived from holding £17000 in the funds at 75, what percentage are they paying?

11. What income will be derived from investing £6500 in the 3½ per cents. at 91?

12. What income will be derived from investing £6250 in the 4¼ per cents. at 102?

13. A person has left to him £4975: he invests £2500 in the 3 per cents. at 75, and the remainder in the 6 per cents. at 91⅔. What is his annual income?

14. What income is derived from investing £1800 in the 2⅔ per cents. at 56¼?

15. What sum of money must be invested in the 4 per cents. at 90, so that an income of £500 a year may be received therefrom?

16. I receive £375 a year from the 4⅛ per cents. at 99, what amount of sterling money should I realize by selling out?

17. If I receive an income of £1800 by investing £45000 in the funds at 90, what percentage are they paying?

18. What percentage must the funds, when quoted at 83⅓, be paying, in order that £1040 a year may be realized by investing £20000?

19. A yearly income of £540 is derived from investing £13500 in the 4½ per cents.: what are they selling at?

20. Find the price of stock when from investing £6000 in the 4⅔ per cents. I receive £350 a year?

21. Which is the better stock for investment, the 4 per cents. at 80 or the 5 per cents. at 90?

22. If the 3¼ per cents. are at 92⅝, and the 3½ per cents. at par, in which is it the more advantageous to invest?

23. Which is the better investment, bank stock paying 10 per cent. at 319, or 3 per cent. consols at 96?

24. If in the above the bank stock fall to 317, and the consols to 95, which would then be the better investment?

25. What percentage is received for capital invested in the 3 per cents. at 75? What for capital invested in the 4¼ per cents. at 85?

26. Find the change of income produced by transferring £12750 from the 5 per cents. at 80 to the 5⅔ per cents. at 85.

27. A person who possesses 100 bonds in the 4 per cents. at 84 changes into the 5½ per cents. at 99. What increase does he thereby make in his income?

28. What change of income is made by transferring £4275 from the 4 per cents. at 80 to the 5½ per cents. at 99?

29. A person who has £3000 in the 4¾ per cents. at 92½ sells out and invests what he receives in the 7½ per cents. at 110. Find the change in his income.

30. Find the change of income made by transferring £2500 from the 5⅛ per cents. at 114⅛ to the 5 per cents. at 94⅞; there being a charge of $\frac{1}{8}$ per cent. for brokerage both on selling out and on investing.

31. What income is derived from £1350 invested in the 6 per cents. at 111⅛? What change in his income will the possessor of it make if he sell out, and invest the proceeds in the 4½ per cents. at 79⅞, brokerage being charged in both transactions?

32. A man has left him £10000. He invests one-fourth of it in the 6 per cent. consols at 112½, one-third of it in the 4½ per cent. consols at 80, and the remainder in the 3 per cent. consols at 75. Find his income.

33. A person invests £4095 in the 3 per cents. at 91; he sells out £3000 stock when they have risen to 93½, and the remainder when they have fallen to 85. How much does he gain or lose by the transaction?

If he invests the produce in the 4½ per cents. stock at 102, what is the difference in his income?

34. What are the 4½ per cent. stocks selling at, when £8000 stock can be bought for £7350?

35. A person investing in the 4 per cents. receives 5 per cent. for his money; what is the price of stock?

36. If a stock-broker buys for me £1700 stock, brokerage being at $\frac{1}{8}$ per cent., what sum does he receive?

37. If a person sells £4000 stock in the 3 per cents. for £3200, what is the price of stock?

38. I wish to purchase £4000 stock in the 5½ per cents., when they are selling at 95; find (1) what I shall have to pay for it, and (2) what income I shall derive from it.

39. A person having £5600 in the 3¼ per cents. sells out at 93, and invests the proceeds in stocks which pay 5 per cent., at 108½; required the alteration in his income.

40. A person invested £2205 in the 3 per cent. consols at 90. He afterwards sold out at 93½, and invested the proceeds in the Russian 4½ per cent. stock at 98. What addition is thereby made to his income?

41. *A* has stock in the 3 per cent. consols which produces him £300 per annum. He sells out one-half at 92, and invests the proceeds in the South Devon Railway when a £50 share is worth £23. What dividend per cent. per annum ought the South Devon Railway to pay, so that he may increase his income £50 per annum by the transaction?

42. A sum of £6825 is invested in the 3 per cents. at 91: of the stock so purchased, £5000 is sold out when the funds

have risen to 93½, and the remainder when they have fallen to 85. How much is gained or lost by the transaction?

If the produce be invested in the 4½ per cent. stock at par, what is the difference in income?

43. A man invests £7620 in the 3 per cents. at 95¼. He sells out one-fourth of his stock when the funds have fallen to 93½, £3600 stock when they have risen to 96, and the remainder at par. What sum does he gain?

If he invest the proceeds in the Russian 4½ per cents. at 97, what is the difference in his income?

44. *A* buys 200 shares in the South Devon Railway for which he gives £100 per share. When they are paying 2 per cent., he sells them all at £46 per share, and invests the proceeds in the 3 per cent. consols when they are at 92 Find the alteration in his income in consequence of the operation.

45. A man invests £4297. 10*s.* in the 3 per cents. at 95½. He sells out one-third of his stock when the funds have fallen to 94, £1600 when they have risen to 96¼, and the remainder at par. What sum does he gain?

If he invest the proceeds in the French 3 per cents. at 67·50, what is the difference in his income?

46. What income is derived from £12000 stock in the 3½ per cents. at 96? and what sum must be invested in the 3 per cents. at 90 to produce the same income?

47. When the 3 per cents. are at 97⅞, what must be the price of a 3¼ per cent. stock held under the same conditions, that it may be advantageous to transfer from the former stock into the latter, the commission on the transfer being $\frac{1}{8}$th per cent.?

48. When the 3 per cents. are at 80, how much stock must be sold out to pay a bill of £690. 3*s.* 9*d.*, due 9 months hence at 3 per cent. per annum simple interest?

EXERCISE LI.

EXCHANGE.

1. If 2½ gulden are equivalent to 18 shillings, and 20 shillings equivalent to 25 francs, find the value of 12 gulden in francs.

2. When the rate of exchange between England and Turkey is 51 shillings for 5 ducats, and that between England and France £1 for 25 francs, find the value of 16 ducats in francs.

3. If the rate of exchange between England and Spain be 20 shillings for 4 piastres, and that between France and England be 20 francs for 15*s.* 9*d.*, how many francs should be given for 33 piastres?

4. When 3 ducats are equivalent to 31 shillings, and 20 shillings to 25½ francs, what is the value of 10 ducats in francs?

5. A wine merchant exchanges two dozen of wine for 36 lbs. of tea: if 2 lbs. of tea are equivalent to 5 lbs. of coffee, and 1 lb. of coffee be equivalent to 3 lbs. of sugar, find how many lbs. of sugar should be given for a bottle of wine.

6. If the rate of exchange between England and France be 20 shillings for 25⅓ francs, and between England and Turkey be £10 for 19 ducats; find the value of 3 ducats in francs.

7. If 6 gulden be exchanged for 17*s.* 6*d.*, and £4 for 5 Napoleons (a Napoleon being 20 francs), find the value of 12 gulden in francs.

8. When the rate of exchange between England and Rome is £1 for 4·7 scudi, and between England and France 16*s.* for 20⅐ francs, find the value of 36 francs in scudi.

EXERCISE LII.

TIME AND DISTANCE.

1. *A* and *B* start to meet each other from places 34 miles apart. If *A* walks 4½ miles an hour, and *B* 4 miles an hour, find how long they will have been walking when they meet, and what distance each of them will have passed over.

2. Two men start to meet each other at 9 A.M., from places 31 miles apart: if one of them walks 4¼ miles an hour, and the other 3½ miles an hour, when will they meet, and how far will each have walked?

3. *A* starts from Cambridge, walking at the rate of 3¾ miles an hour, to meet *B* who starts at the same time from London, and walks 3½ miles an hour. Taking the distance to be 50¾ miles, when will they meet, and how far will each have walked?

4. A mail train leaves Edinburgh for London (400 miles) at 8.20 A.M., and travels at the rate of 45 miles an hour; another train leaves London for Edinburgh at 9 A.M., and travels at the rate of 47½ miles an hour. Find when they will meet, and at what distance from Edinburgh.

5. A policeman sets off after a thief at 7 A.M., the thief having had 2½ hours start. If the thief goes 4 miles an hour, and the policeman 5¼ miles an hour, when will the policeman catch the thief?

6. A train starts from Paris for Lyons, a distance of 315 miles, at 7.45 P.M., and travels at the rate of 34 miles an hour: another train starts from Lyons for Paris at 6.30 P.M., and travels at the rate of 32 miles an hour. Find at what time they will meet and at what distance from Paris.

7. A gentleman, being 2 minutes late for his train, after half a minute's consideration, determined to take a special train, which was got ready in 20 minutes. If the rate of the ordinary train was 32 miles an hour, and that of the special train 48 miles an hour, find how far the ordinary train had travelled before it was caught by the special train.

EXERCISE LIII.

TIME AND WORK.

1. If *A* can do a piece of work in 10 days, which *B* can do in 6 days; what time would they require to finish it if both of them were working at it?

2. *A* can do a piece of work in 12 days, *B* can do it in 15 days, and *C* in 10 days; find how many days they would take if they all worked together.

3. Three masons, each working alone, can build a wall in 30, 24, and 20 days respectively; in how many days will the wall be built if all the three are engaged upon it?

4. *A*, *B*, and *C* working together can dig a certain trench in 12 days; *A* by himself would require 36 days to dig it, and *B* by himself 42 days; in what time could *C* dig it?

5. *A* can reap a field in $4\frac{1}{2}$ days of $10\frac{1}{2}$ hours each, *B* can reap it in the same time, *C* can reap it in 3 days of the same length. How long would they take to reap the field if they were all working together?

6. Three men, working together, can reap a field in 2 days of 12 hours each; one of the three can do it by himself in 5 days. If the other two are possessed of equal powers of working, find what time each of them would take to do the work by himself.

7. A cistern is supplied with three pipes *A*, *B*, and *C*. *A* fills it in 5 minutes, *B* fills it in $7\frac{1}{2}$ minutes, *C* empties it in $3\frac{3}{4}$ minutes. How long would it take to fill the cistern if they were all opened at the same time?

8. If when the above-mentioned cistern was empty, the pipe *A* was open for 3 minutes, and afterwards *A* and *B* together for 1 minute, find when the cistern would be again empty if *A* was then closed and *C* opened.

9. A cistern has two filling pipes; *A*, which fills it in 2 hours, and *B*, which fills it in 4 hours, and an emptying pipe *C* which empties it in 40 minutes. *A* is opened at noon, *B* at 1 P.M., and *C* at 1.15 P.M. Find what part of the cistern is full at 1.30 P.M., and also when it will be empty.

10. Three men can mow a certain field in 6 days; at the end of the second day one of them falls ill, and the other two finish the work after mowing 9 days from the time when they began. How long would the third man have taken to mow the whole field by himself?

11. Two pipes, *A* and *B*, fill a cistern in $7\frac{1}{2}$ minutes and $12\frac{1}{2}$ minutes respectively, a third pipe *C* empties it in 4 minutes, 10 seconds. If after *A* has been open for a minute and a half, *B* also be opened, when will the cistern be full? If after this, all three were open, when will the cistern be half-empty?

12. *A* can do a piece of work by himself in 15 days of 12 hours each, *B* can do half of it in 6 days, *C* and *D* can

each do half of it in 5 days. *A* starts by himself at the work on Monday morning, and is joined by *B* on Wednesday morning; for how many hours at the end of the week would *C* and *D* (beginning together) have to help that the work might be completed by Saturday evening?

13. Four men can do a piece of work in one hour, which two women can do in three hours, or six children in two hours; find how long one man, one woman, and one child would take to do the work.

14. At the siege of Sebastopol it was found that a certain length of trench could be dug by the soldiers and navvies in 4 days, but that when only half the navvies were present, it required 7 days to dig the same length of trench. Shew that the navvies did six times as much work as the soldiers.

15. A cistern which is supplied by two pipes, can be filled by one of them in 40 minutes, by the other in an hour. These were both opened at the same instant, but it was found that owing to a leak it took half an hour to fill the cistern: supposing the cistern to have held 240 gallons, find how much water escaped by the leak per minute.

EXERCISE LIV.

SQUARE ROOT.

∵ The answers in this exercise are not carried more than four places beyond the decimal point.

Find the square root of the following numbers:

1. 576, 611524, 18671041.
2. 46090521, 9030025, 10004569.
3. 4020025, 1863821584, 7455286336.

4. 1164·1744, 136966·6081, 240168·6049.

5. ·16, ·016, 64·853.

6. ·0144, 15·625, 2·1.

7. ·4, ·03, ·007.

8. ·0008, ·00009, ·000009.

9. ·75, ·012, ·003.

10. $\cdot\dot{1}$, $\cdot\dot{4}$, $\cdot\dot{9}$.

11. $\cdot 01\dot{7}$, $\cdot 0002\dot{7}$, $5\cdot\dot{4}$.

12. $28\cdot\dot{4}$, $\cdot 0013\dot{4}$, $\cdot 071\dot{1}$.

13. Of what number is ·1 the square root?

14. The floor of a square room contains 57·76 sq. feet; what is its length?

15. The surface of a cube is 86·64 sq. feet; what is the length of an edge of the cube?

16. In a right-angled triangle two of the sides are 51 inches, and 24 inches in length; what is the length of the third side?

17. The sides of a right-angled triangle which include the right angle are 1311 and 1748 feet respectively; find the length of the third side.

18. Given that the square of 10129 is 102596641, find the square of 101293 without going through the operation of squaring.

19. Given that the square root of 105625 is 325, find that of 10582009.

20. Calculate the value of $\frac{2+\sqrt{3}}{2-\sqrt{3}}$ to one place beyond the decimal point.

EXERCISE LV.

ON THE PRINCIPLES OF ARITHMETIC.

1. In a multiplication sum, why are the lines obtained by multiplication not placed one directly over another?

2. Define: prime numbers; numbers prime to each other; composite numbers; abstract and concrete numbers.

Can concrete numbers be multiplied together? Give a reason for your answer; and discuss the case, 5 ft. × 5 ft. = 25 sq. ft.

3. How do you find the correct remainder when you divide by the factors of a composite number? e.g. $289145 \div 252$.

4. How can you tell by inspection if a number is divisible by 2, 3, 4, 5, 6, 8, 9, 10, or 11?

5. Explain the signification of each word in the expressions "Greatest Common Measure," and "Least Common Multiple."

6. Define a fraction. Why is a fraction increased by its denominator being diminished? Explain fully why $\frac{2}{5}$ is the same as $\frac{6}{15}$.

7. Shew by drawing a figure that $\frac{4}{5} = \frac{12}{15}$; also that $\frac{1}{3}$ of $\frac{1}{5} = \frac{1}{15}$.

8. Explain the connection between the methods of writing decimal fractions and whole numbers. In the number 444·44 shew that there is the same relation between every two contiguous figures.

9. What advantages and what disadvantages have decimal fractions as compared with vulgar fractions?

10. Give the reason for the rule "Increase the last retained figure of decimals by unity if the first neglected figure is 5 or more than 5."

Shew that ·318 differs less from ·317875 than ·317 does; and find what is the least actual error that need be made, if we retain only 3 places of decimals, in ·317875 of £100.

11. State the difference between Interest and Discount. In a question in Discount what relation does the Discount bear to the Present Value? How does Mathematical Discount differ from Mercantile?

12. State what is meant by "casting out the nines" as a method of proving a question in Multiplication, and give an example of it.

EXERCISE LVI.

MISCELLANEOUS EXAMPLES.

1. How many dollars, worth 4*s.* 6*d.* each, are there in 3000 guineas?

2. Find the product of the sum and difference of 140 and 20.

3. Divide 73584123 by 3465, dividing by its factors 7, 9, 5, 11, and shewing how to find the real remainder.

4. If 2 tons 10 cwts. 15 lbs. 23 oz. of goods be divided among 219 people, what would be the average share of each?

5. £1000 has to be divided among 23 persons: find the share of each, to the nearest farthing; and also the sum of all the shares so calculated.

6. Add together $\frac{2}{5}$, $\frac{1}{8}$ of $3\frac{1}{3}$, and $\frac{42}{35}$. Subtract from the result the quantity $\frac{1}{6}+\frac{1}{3}$, and reduce the remainder to a decimal.

7. Find the cost of 250 lbs. of tea at 3*s.* 11½*d.* per lb. If 10 lbs. be spoiled, what will the merchant gain by selling the remainder at 4*s.* 6*d.* per lb.?

8. A sum of money amounting to £7816, free of legacy duty, was left by will to be divided equally among a certain number of legatees. The share proved to be £325. 13*s.* 4*d.*; what was the number of legatees?

9. What fraction of £225 is £3. 4*s.*? Reduce the result to a decimal.

10. Thirty years ago a man was three times as old as his son whose present age is 45. How old is the father?

11. Express ·4568 as a vulgar fraction in its lowest terms; and reduce 1*s.* 4½*d.* to the decimal of 5*s.*

12. Find the value of 157 tons at (1) £7. 7*s.*, (2) £2. 16*s.* 8*d.*, (3) £4. 11*s.* 8*d.* per ton.

Each result may be obtained by Practice, by making use of one aliquot part only.

13. A person exchanged 267 guineas for money of the present coinage, and one-half of the value which could not be paid in gold was paid in farthings. What coins did he receive?

14. "When hay was fetching £5 a ton, a well-to-do farmer hid himself in a load, and his weight was of course added to that of the hay. Before the hay was shipped, the trick was detected, and after another weighing, 7*s.* 6*d.* was deducted from the price." Find the weight of the farmer.

15. If six dollars, four florins, and four half-crowns, be exchanged for £2. 3*s.*; what is the exchange for a dollar?

16. Find the sum of $3\frac{5}{8}$, $17\frac{1}{4}$, 476, and 3·125; and express $2\frac{2}{3}$ of 16 acres as a decimal of a square mile.

17. Reduce $183\frac{3}{4}$ guineas to three-penny pieces; and find what fraction this sum is of £964. 13*s.* 9*d.*

18. Divide 10 lbs. 5 oz. $15\frac{3}{7}$ dwts. into 16 parcels of equal weight.

19. Reduce 2 mi. 6 fur. 3 po. 3 yds. 1 ft. to inches; and 17592 inches to furlongs.

20. Reduce 62466 inches to furlongs; and 392041 square inches to square poles.

21. Find the sum of $\frac{1}{5}$ of $\frac{2}{3}$ of $\frac{25}{28}$ of $\frac{7}{10}$ and $\frac{1}{8}$ of $2\frac{2}{3}$ of $7\frac{1}{5}$ of $2\frac{1}{12}$.

22. Compare the values of $\frac{1}{4}$, $\frac{5}{9}$, $\frac{5}{12}$, and $\frac{3}{16}$; also of $\frac{1}{5}$, $\frac{3}{10}$, $\frac{2}{15}$, and $\frac{5}{12}$.

23. Divide $2\frac{1}{3}$ of $\frac{1}{7}+3\frac{1}{4}+2\frac{1}{12}$ by $3\frac{1}{3}$ of $\frac{7}{10}+5\frac{1}{4}$ of $1\frac{5}{7}$ of $\frac{2}{3}$.

24. Simplify

(i) $2\frac{1}{2}$ of $\frac{3}{5}+\frac{1}{3}$ of $2\frac{1}{4}$ of $5\frac{1}{3}+\frac{1}{9}$ of $4\frac{1}{2}$.

(ii) $3\frac{1}{4}-4\frac{2}{5}-2\frac{1}{2}+7\frac{11}{24}-2\frac{5}{8}$.

25. Find the value of 3 cwts. 2 qrs. 16 lbs. at £3. 7*s.* 6*d.* per cwt.

26. If 22 copies of a book cost £6. 1*s.*, what is the price of 100 copies of it?

27. Find the simple interest upon £1355. 7*s*. 6*d*. for 4 years at 5 per cent. per annum.

28. A room is 18 ft. high, 25 ft. long, and 21 ft. wide; find the area of its floor, and the area of its four walls.

29. Multiply 3·51 by ·075; and divide 8·5 by ·034.

30. Multiply $2{\cdot}2\dot{7}$ by $\cdot 08\dot{3}$; and divide $11{\cdot}8\dot{3}$ by $\cdot 08\dot{3}$.

31. Find the value of $127\frac{5}{12}$ acres of land, if 32 acres 3 ro. of it are worth £6. 2*s*. 6*d*. an acre, and the remainder £7. 7*s*. 2*d*. an acre.

32. A room is 21 ft. long, $16\frac{1}{2}$ ft. broad, and 18 ft. high; find how many square yards of paper will be required for the walls, and find also the cost of carpeting the room at 7*s*. 6*d*. a sq. yd.

33. Divide $2\frac{1}{3}+5\frac{1}{2}$ by $3\frac{1}{4}$ of $\frac{8}{13}$; and $8\frac{1}{3}$ of $\frac{7}{15}+4\frac{2}{3}$ of $\frac{7}{11}$ by the sum of $7\frac{1}{9}$ of $\frac{5}{16}$ and $\frac{13}{18}-\frac{2}{9}$.

34. What is the difference between the values of $15{\cdot}\dot{3}\times 1{\cdot}0\dot{5}$ and $\cdot 0\dot{1}\dot{8}\times\cdot\dot{2}2\dot{0}$?

35. A person who owes me £1046, can only pay 12*s*. 6*d*. in the £; what shall I lose on the debt?

36. If 12 masons earn £45 in 15 days, how much would 13 earn in 25 days?

37. £420. 10*s*. 6*d*. is put out at simple interest at $3\frac{1}{2}$ per cent. per annum: what will it have amounted to at the end of 4 years?

38. Find the present value of £146. 5*s*. 5*d*. due at the end of 4 months, interest being calculated at 6 per cent. per annum.

39. Divide £43. 15*s*. between 2 persons, so that their shares may be as 3 : 4.

40. Tea which was bought at 12 guineas the cwt. is retailed at 3*s*. a lb.; find the gain per cent.

41. The sum of £36. 18*s*. 6*d*. is made up of an equal number of half-crowns and shillings; how many are there of each?

42. Forty-two men are employed on a piece of work and each of them receives 3*s*. 5*d*. a day. If one of the forty-two falls ill, and his work and pay are divided among the others, what will be the daily wage of each of them?

43. Reduce 9*s*. $11\frac{1}{4}$*d*. to the decimal of 13*s*. 3*d*.; 6*s*. 8*d*. to the decimal of 5*s*.; 7*s*. $10\frac{1}{2}$*d*. to the decimal of £2.

44. Find the sum of $2\frac{1}{3}$, $3\frac{5}{8}$, and $2\frac{1}{4}$ of $3\frac{1}{8}$; also of $\frac{2\frac{1}{4}}{3\frac{1}{8}}$ and ·125.

45. Divide ·073 by 3·65, and 73 by ·00365: also reduce 73 days to the decimal of a year.

46. How much paper 2 ft. 6 in. wide will be required for papering the walls of a room 27 ft. 10 in. long, 19 ft. 8 in. wide, and 15 ft. high?

47. If a rate of $8\frac{1}{2}$*d*. in the £ produce £61. 19*s*. 7*d*., what is the corresponding income?

48. Find the net income corresponding to a gross income of £1000 a year, when the income-tax is 7*d*. in the £.

49. If 12 cwts. 2 qrs. 20 lbs. of sugar cost £25, what is the value of 2 qrs. 15 lbs.?

50. A room is 8 yds. long, $13\frac{1}{2}$ ft. broad, and 21 ft. high, find the area of the floor, and the area of the four walls.

51. Reduce 1210 ft. to poles.

52. If $1\frac{2}{3}$ of $\left(A-\frac{2}{5} \text{ of } A\right)=2\frac{1}{2}$ of $\left(B+\frac{B}{4}\right)$, find 2 whole numbers which shall be to each other in the ratio of A to B.

53. A ship and cargo captured in time of war were valued at £3365, and the average amount of prize-money due to each man was £44. 17*s.* 4*d.*; of how many did the crew consist?

54. A man has £3000 in hand, having lost a quarter of his property in speculation, and purchased a partnership in business with three quarters of the remainder. What was he worth at first?

55. Two houses are built: the first is twice as long in building as the second; half as many men again are employed in building the first; their wages per hour are one-third higher; they work 10 hours a day and 6 days a week, while the others work only 8 hours a day and 5 days a week. The cost of the second house in workmen's wages was £1000: what was that of the first?

56. A farmer rents a farm of 800 acres on the following terms; he pays a fixed rent of 4*s.* 6*d.* an acre, and a corn rent of 250 quarters of wheat, 150 quarters of barley, and 100 quarters of oats. The price of wheat, barley, and oats being respectively 45*s.*, 29*s.* 4*d.*, and 19*s.* 6*d.* per quarter, find his rent per acre.

57. Express as a fraction in its lowest terms the recurring decimal ·125454....; and reduce 2 days 6 hrs. 19 min. to the decimal of a week.

58. Find the present worth of a bill for £364. 1*s.*, due $4\frac{1}{2}$ months hence at 3 per cent. per annum.

59. Distinguish between Mathematical and Mercantile Discount, and find their difference in the last question.

60. Find the sum, difference, product, and two quotients of 10·01 and ·0091.

61. Reduce 91909 feet to perches.

62. What is the least number of dollars at 4*s.* 2*d.* each, which is equal to an exact number of sovereigns?

63. Prove that $\frac{5+6}{6+7}$ is greater than $\frac{5}{6}$, and less than $\frac{6}{7}$.

64. A fixed rent of £780 per annum is converted into a corn rent of one half, wheat at 48*s.* per quarter, and the other half, barley at 30*s.* per quarter. What will be the rent when wheat has advanced to 56*s.*, and barley to 32*s.* per quarter?

65. A dealer bought 23¼ cwts. of sugar, and sold one-third at 6*d.* and the rest at 6½*d.* per lb.; how much money did he receive? And if he gained £9. 0*s.* 10*d.* on the transaction, find how much per cwt. he gave for the sugar.

66. A ship's crew consists of a captain, 3 officers, and 36 men; the captain gets 4 times as much prize-money as each officer, and the officers together 12 times as much as each man. What do they respectively receive out of a prize of the value of £1000?

67. A bankrupt who is paying 7*s.* 6*d.* in the £, divides among his creditors £1575; what do his debts amount to?

68. How much does a man, whose income is £762. 10*s.*, save in the year by the reduction of the income-tax from 9*d.* to 7*d.* in the £?

69. Find the vulgar fractions equivalent to the circu-

lating decimals ·3$\dot{3}$, 1·03$\dot{3}$, 1·2$\dot{5}\dot{6}$; and divide ·0707817 by ·02651.

70. Find the value of 23·456 of £5. 10*s.*, and add it to $\frac{2}{3}$ of $\frac{1}{5}$ of £2. 6*s.* 8*d.*

71. Divide 15 cwts. of cheese amongst 80 men and 104 women, so that each man shall have half as much again as each woman.

72. Four persons are to share equally a certain sum of money, on the understanding that if each person's share exceed 50 guineas, half of the surplus is to be applied to another purpose. The sum being £325. 15*s.*, what will each person receive?

73. Distinguish between Interest and Discount.

Find the amount of £102. 10*s.* in 9 months at 3¼ per cent. per annum simple interest, and the present value of £102. 10*s.* due 9 months hence at the same rate of interest.

74. The daily issue of *The Times* is 60,000 copies. Three days of the week it consists of 3 sheets, and the other three of 4 sheets. If a sheet be 3 feet long and 2 feet broad, find the number of acres which the weekly issue of *The Times* would cover.

75. The property of a bankrupt amounts to £5000. It is estimated that the creditors will receive a dividend of 5*s.* in the £; it is found however that one debt has been omitted, and this reduces the dividend to 4*s.* 6*d.* in the £; what is the amount of that debt?

76. At what rate per cent. will £300 amount to £328. 2*s.* 6*d.* in 2½ years, at simple interest; and what would be the amount at compound interest for the same period?

77. A person buys a piece of land, at £30 an acre, and by selling it in allotments finds the value increased threefold, so that he clears £150 and reserves 25 acres for himself: how many acres were there?

78. Find the present value of two sums of £10 each, to be paid at the end of one and two years respectively, money making 5 per cent. per annum. Verify your result by showing that the value which you have obtained is just sufficient to pay the sums due at the end of each year.

79. A man invests half his fortune in land, a fifth of it in the funds, a sixth in exchequer bills, and loses the remainder, which is £2000, in speculation. What was his fortune at first?

80. Express $\frac{5}{8}$ of 17*s.* 6*d.* + ·125 of 16*s.* − $\cdot 5\dot{2}\dot{7}$ of 13*s.* 9*d.* as a decimal fraction of £5.

81. In which stocks is it the more profitable to invest, the 5 per cents. at 90, or the $4\frac{1}{2}$ per cents. at 80?

82. Simplify $1\frac{1}{2}+\dfrac{\frac{3}{5}\text{ of }4\frac{1}{2}}{\frac{9}{10}}-\dfrac{5\frac{1}{3}}{8}-\dfrac{4\frac{1}{2}-1\frac{2}{3}\text{ of }1\frac{4}{5}}{\frac{1}{3}+\frac{1}{6}+\frac{1}{12}+\frac{1}{24}}$.

83. Find the sum of 2·875 of 3*s.* 4*d.*, 3·875 of 12*s.* 6*d.*, and $4{\cdot}8\dot{3}$ of £1.

84. Reduce 3*s.* $8\frac{1}{4}$*d.* to the decimal of £1; and ·35 of £1. 10*s.* 1*d.* to the fraction of £1. 0*s.* $11\frac{1}{4}$*d.*

85. Express as a simple decimal $1\frac{1}{2}$ of $3\frac{1}{4}+\cdot 01\dot{6}+\dfrac{1\frac{1}{3}-\frac{1}{4}}{2\frac{1}{2}+\frac{1}{8}}+\dfrac{1{\cdot}25}{\cdot 08}$.

86. Find the value of 2843 railway shares, at £137. 18*s*. 9½*d*. each.

87. At what rate of interest will £935. 13*s*. 4*d*. amount to £1093. 11*s*. 2½*d*. in 3 years and 9 months?

88. In what time will £437. 12*s*. 6*d*. produce £32. 8*s*. 4*d*. at 3⅕ per cent. per annum?

89. Find the discount upon a bill for £522. 2*s*. paid 2¼ years before due, interest being reckoned at 6 per cent. per annum.

90. What is the value of 3 cwts. 2 qrs. 17 lbs. of copper at £3. 17*s*. per cwt.?

91. A grocer mixes 120 lbs. of sugar at 6½*d*. a lb., 120 lbs. at 5½*d*. a lb., and 50 lbs. at 6*d*. a lb. At what price must he sell the mixture so as to gain 20 per cent. upon his outlay?

92. A tank has 3 pipes *A*, *B*, and *C*. *A* and *B* can fill it in 8 hours and 4 hours respectively, *C* can empty it in 2 hours. If *A*, *B*, and *C* are opened at 1, 3, and 5 o'clock respectively, find when the tank will be full, and when empty again?

93. Two ships are built: twice as many ship carpenters are employed about the first as about the second; the first is built in 9 months, the second in 8 months; the wages of each man of the first set are 7*d*. an hour, and they work 12 hours a day; the wages of each man of the second set are 6*d*. an hour, and they work 10½ hours a day. The cost of the first ship in carpenters' wages is £6000; what was that of the second?

94. If a gallon contain 277·25 cubic inches, and a gallon of pure water weigh 10 lbs., find approximately the weight of a cubic foot of water in ounces.

95. Find the number of farthings in the sum of $\frac{5}{6}$ of £1, $\frac{4}{25}$ of 9*s.* 11¾*d.*, ·3 of a guinea, and ·451 of £1.

96. If I buy 40lbs. of tea at 3*s.* 6*d.*, and 60lbs. at 2*s.* 8*d.*; at what price per lb. must I sell the whole, so as to gain 12½ per cent. on my outlay?

97. What interest does a man get for his money when he invests in the 3 per cents. at 84⅜?

98. A person invests £36893. 6*s.* 8*d.* in the purchase of 40 houses, which yield a net average rental of £69. 3*s.* 6*d.* each; what interest does he receive for his money?

99. Divide 1000 guineas among 3 persons in the proportion of 5, 7, and 8.

100. What income would be derived from investing £10400 in the 3½ per cents. at 91?

101. The Centigrade Thermometer is marked from 0° to 100°, the Fahrenheit from 32° to 212°. What degree of Fahrenheit corresponds to 55° Centigrade?

102. If I buy a horse for £56, and sell him again for £57. 15*s.*, what profit per cent. do I make?

103. Find the expense of papering a room, 25½ft. long, 16½ft. wide, and 14ft. high, with paper 2ft. 4in. wide at 4½*d.* a yard.

104. *A*, *B*, and *C* join in trade; *A* puts in £1000 for 8 months, *B* £1500 for 4 months, and *C* £2000 for 2 months: divide fairly between them a profit of £900.

105. Determine the least number of yards of ribbon that can be divided exactly into English, French, and Flemish ells.

106. If a man's income is £1250 a year, find what income-tax he would have to pay, at the rate of 9*d.* in the £. Also find what he would gain per cent. (1) on his income, (2) on his tax, by the reduction of the tax from 9*d.* to 6*d.* in the £.

107. How many bricks 9 in. long, 4½ in. broad, and 4 in. thick, will be required for a wall 30 ft. long, 20 ft. high, and 4 ft. thick, allowing 6¼ per cent. of the space for mortar?

108. Explain the following extract from *The Times:* "Consols which left off last evening at 94⅛ to ¼ opened at 94 to ⅛, and remained in that variation to the close of business."

109. If the discount on £226. 2*s.* 8*d.* due at the end of a year and half be £12. 16*s.*, what is the rate of interest?

110. The imperial gallon contains 277·27 cubic inches, and a cubic foot of water at its maximum density weighs 62·42 lbs.; find the weight of a pint of water correctly to two places of decimals.

111. A person travels 200 miles, the first half by railway, and the remainder by coach. On arriving he finds that his average speed has been 16 miles an hour. The average speed of the train was 40 miles an hour. At what rate did the coach travel?

112. The diameter of a circle is to its circumference as 1 : 3·14159 nearly. Supposing the earth to be a sphere of 7925 miles radius, find approximately what time it would take to go to the antipodes, i.e. exactly half round the earth, provided there were no obstacle to proceeding uniformly at the rate of 10 miles an hour.

113. A man rows a distance of $1\frac{1}{2}$ mile down a stream in 20 minutes, but without the aid of the stream it would have taken him half an hour; what is the rate of the stream per hour? and how long would it take him to return against it?

114. How many sheep must a person buy at £7 each, that after paying one shilling a score for folding them for a night, he may gain £79. 16*s.* by selling them at £8 each?

115. What principal put out to interest at $3\frac{1}{2}$ per cent. per annum will produce £46. 0*s.* $7\frac{3}{8}$*d.* in 10 months?

116. If 7 per cent. is gained by selling goods for £1. 15*s.* 8*d.*, what will be the gain per cent. if they are sold for £2. 3*s.* 4*d.*?

117. £519. 10*s.* 11*d.* is to be divided among 4 men, 7 women, and 6 children, so that the shares of a man, a woman, and a child shall be in the proportion of 5, 3, and 1; find the share of each.

118. Find the discount upon a bill for £2828 due 2 years, 146 days from this time, at 5 per cent. per annum.

119. Determine the amount at compound interest upon £800 for $2\frac{1}{2}$ years at 4 per cent. per annum.

120. If 7 men mow 42 acres in 6 days of $8\frac{1}{4}$ hours each, how many hours a day would 10 men have to work, so as to mow 104 acres in 11 days, supposing each of the 10 men to do as much work in $2\frac{1}{2}$ hours as each of the 7 men does in 3 hours?

121. A room is 60 feet long by 29 feet wide; how many people can be seated in it on chairs $1\frac{1}{2}$ foot wide, and placed 2 feet apart from back to back; allowing a clear passage 3 feet wide down the middle of the room, and a space 15 feet deep at one end?

122. A tank is 7 feet deep, 4 yards long, and 3 yards broad; what weight of water is there in it?

123. A certain crew who row 40 strokes to the minute start at a distance equivalent to four of their own strokes behind another crew who row 45 strokes to the minute; in 8 minutes the former succeed in bumping the latter; find the ratio between the lengths of the strokes in the two boats.

124. An ordinary train on the Great Eastern Railway is 1 hour, 57 min. in travelling between Wymondham and Ely, and the express train takes 54 minutes less. If an express leave Cambridge at 9 A.M., and arrive in London just as an ordinary train is leaving which arrives in Cambridge at 2 P.M., find how long the express is in going to London.

125. An American dollar at par of exchange is worth 4*s.* 6*d.* of our money. What is the value of 642 dollars when the exchange is 7 per cent. in favour of England?

126. *A* can do a piece of work in 20 days which *B* can do in 30 days: after *A* has worked alone for 5 days, *B* joins him and they work together for 4½ days, when *C* comes in, and the three working together finish the work in 3 days more; in what time could *C* do the whole work alone?

127. How much will be gained by investing £5000 in the 3 per cents. when at 86⅛, and selling out when they are at 91⅞? Also, find what would be the difference of income before and after the operation if the money, when not invested, bore interest at 1½*d.* per cent. a day.

128. At what rate of simple interest will £1853. 2*s.* 6*d.* amount to £1992. 2*s.* 2¼*d.* in 3 years?

129. What sum of money will amount to £1409. 3*s*. 7⅗*d*. in 2 years at 6 per cent. per annum, compound interest?

130. A grocer buys one sort of tea at 5*s*. 6*d*. a lb., and another sort at 3*s*. 6*d*. a lb., and mixes them in the proportion of 5 parts of the cheaper to 7 parts of the dearer; at what price per lb. must he sell the mixture so as to realize 25 per cent. profit on his outlay?

131. The contents of a room are 5940 cubic feet, its length is 27½ ft., and its breadth 16 ft.; find the area of its walls: also, there being 2 windows 6 ft. high, and 4 ft. wide, and one door 8 ft. high, and 4 ft. wide, find the cost of paper for the walls, the paper being a yard wide, and the price 3½*d*. a foot.

132. Find the square root of 20, 86, and ·02, each to 3 places of decimals.

133. Divide 9·614 by ·0000019, and $\frac{2\frac{1}{5}}{5\frac{1}{2}}$ by $\cdot 000\dot{3}$; then multiply the sum of the quotients by ·0005.

134. Gold is sold to the Mint at £3. 17*s*. 9*d*. per oz., and is mixed with alloy, worth 5*s*. 2*d*. per oz., in the ratio of 11 to 1. If sovereigns are coined of this mixture each weighing 5 dwts. 3·247 grains, find approximately what is the Mint profit on 100 sovereigns.

135. Find the value of 3⅞ of 2*s*. 6*d*. $-\cdot\dot{4}1269\dot{8}$ of a guinea + 2·75 of £30.

136. A merchant allowed his agent 4½ per cent. on the value of the goods he sold for him, on the condition that the agent should make good all bad debts. The value of the goods was £4684. 11*s*. 8*d*., and the loss from bad debts was £10. 16*s*. 1½*d*.; what was the agent's clear gain?

137. Reduce 4*s.* $10\frac{1}{6}$*d.* to the decimal of 9*s.* Explain how it is that 9 figures in the period are consistent with the ordinary rule limiting the number of figures in the period.

138. From the sum of ·628125 of a £, ·109375 of £5, 47·3125 of a shilling, and $\frac{3}{5}$ of $\frac{\cdot\dot{7}}{1\frac{3}{4}}$ of 1·2421875 of 13*s.* 4*d.*, subtract $2\cdot9553\dot{5}7142\dot{8}$ of a guinea.

N.B. $\frac{4}{7} = \cdot\dot{5}7142\dot{8}$.

139. A room, 18 ft. by 24 ft., and 9 ft. high, is to be carpeted with a carpet 32 inches wide at 2*s.* $7\frac{1}{2}$*d.* a yard, and papered with a paper $\frac{3}{4}$ of a yard wide, at $2\frac{1}{4}$*d.* a yard; windows covering a twelfth of the walls are to be glazed at 1*s.* 3*d.* a square foot, and the doors taking up an eighteenth of the walls are to be painted at 2*s.* 6*d.* a square yard: find the whole cost.

140. A path, 3 feet wide, has to be made 4 feet from the walls round a court measuring 105 yards by 95 yards; how many sq. yards will it cover?

141. If the discount on a bill due in 5 months at 4 per cent. per annum be £1, find the payment made.

142. A person has a number of oranges to dispose of; he sells half of what he has and one more to one person, half the remainder and one more to a second person, half of the remainder and one more to a third person, and half of the remainder and one more to a fourth person, by which time he had disposed of all he had: how many had he at first?

143. If 3 men be 8 days in raising the fourth foot of a wall which is to consist of 6 courses of masonry, each

course being one foot high; and if the labour of raising each course be proportional to the height of its top above the ground, how long would 7 men take to build the wall?

144. Taking the annual consumption of coal in Great Britain to be 70 million tons, and supposing this piled up into a pyramid having for base the great court of Trinity College, Cambridge, the dimensions of which are 110 yds. by 90 yds.; find the height of the pyramid.

N.B. The volume of a pyramid is equal to the area of the base multiplied into one-third of the height.

145. If the tenth, the hundredth, and the thousandth part of a pound sterling be called a florin, a cent, and a mil, respectively, and a man's weekly wages are £2, 9 florins, 7 cents, and 5 mils, upon which he pays an income-tax of 5 cents in the pound; find his net yearly income, and convert the result into pounds, shillings, and pence.

146. The net rental of an estate, after deducting 7*d.* in the £ for income-tax, and 5 per cent. on the remainder for the expenses of collecting, is £479. 11*s.* 10*d.*: what is the gross rental?

147. *A* dies leaving £27600 between 3 sons and 3 daughters; each son is to have one-third more than the eldest daughter, and the other daughters each £200 less than the eldest. Find what each receives.

148. The cost of a cube of metal at £3. 10*s.* 4*d.* per cubic inch is £1206. 4*s.* 4*d.*; find the cost of gilding it at ½*d.* per square inch.

149. In a boat race over a course of 2¼ miles, one boat (*A*) pulls 30 strokes to the minute, the other (*B*) 35 strokes,

but 5 strokes of *A* are equal to 6 strokes of *B*, compare the rates of the boats: and if *A* does the course in 15 minutes, how long will *B* take, and what part of a mile will *B* be before or behind *A* at the end of the race?

150. What sum of money will amount to £2315. 5*s.* in 3 years at 5 per cent. per annum, compound interest?

151. A money-lender discounts a bill of £180 drawn at 4 months, at 60 per cent. per annum, and insists on giving in part payment 5 dozen of wine which he charges at 4 guineas a dozen, and a picture which he charges at £19: how much ready money does he pay?

If the cost to the money-lender of the wine and the picture be only one-fourth of the sum he has charged for them, what is the real interest he has been charging?

152. What change of income is made by taking £18000 stock out of the 3 per cents. when they are at 90, putting it out at compound interest at 4 per cent. for a year and a half, and then investing the amount in the 3½ per cents. at 98?

153. The paper duty was 1½*d.* a lb.; the weight of a newspaper ¼ lb., and its price 5*d.*; the paper manufacturer made 20 per cent. profit on his outlay, and the proprietor 10 per cent. profit on his sale. What reduction should be made in the price of the newspaper, now that the duty on paper is abolished, allowing to the paper manufacturer and the proprietor the same rate of profit as before?

154. A person finds that if he invests a certain sum in railway shares paying £6 per share when the £100 share is at 132, he will obtain £10. 16*s.* a year more for his money than if he invest in the 3 per cent. consols at 93. What sum has he to invest?

155. A bankrupt has book-debts equal in amount to his liabilities, but on £6000 of them he can only recover 13*s*. 4*d*. in the pound, and the expenses of the bankruptcy are 5 per cent. on the book-debts; if he pays 13*s*. in the pound, what is the amount of his liabilities?

156. *A* has twice as much money as *B*. They play together for a certain stake, and at the end of the first game *B* wins from *A* one-third of *A*'s money. What fraction of the sum *B* now has must *A* win back in the second game that they may have exactly equal sums?

157. A man allows to his agent 5 per cent. on his gross income for the expense of collecting his rents. He spends one-seventh of his net income in insuring his own life, and this portion of his income is in consequence exempt from income-tax. The income-tax being 10*d*. in the pound, and his income-tax amounting to £39. 18*s*., find his gross income.

158. If the estimated annual value of the property in a certain parish consist of the yearly rent paid to the landlord together with the rates, and the rates be calculated upon the rent after a reduction of 30 per cent., find what rent has to be paid for a property, the estimated value of which is £663 per annum, when the rates amount to 3*s*. in the pound.

159. A person leaves £12670 to be divided among his five children and three brothers, so that, after the legacy duty has been paid, each child's share shall be twice as great as each brother's. The legacy duty on a child's share being one per cent., and on a brother's three per cent., find what amounts they respectively received.

160. A baker's outlay for flour is 70 per cent. of his gross receipts, and other trade expenses 20 per cent. The price of flour rises 50 per cent., and trade expenses are thereby increased 25 per cent. What advance must be made in the price of a *5d.* loaf, that he may still realise the same amount of profit from it?

161. If 4 herrings cost *5d.* when the income-tax is *6d.* in the pound, what will be the cost of 12 herrings when the income-tax is doubled, (1) supposing the income of the fishmonger to be £85. 10*s.*, and (2) supposing it to be £300; it being given that he is not to lose by the increase of the income-tax, and that incomes below £100 are not taxed?

162. The transverse section of a river 320 yards broad is a semicircle: find how many tons of water will flow through this section in 49 hours, if the rate of the stream be $1\frac{1}{2}$ mile an hour; it being supposed that the area of a circle is $\frac{22}{7} \times (\text{radius})^2$, and that a cubic foot of water weighs 1000 oz.

163. The pipe which supplies water to a cistern is one-third of the size of the stopcock for letting it off. If when the cistern was full, the pipe and the stopcock were both opened, and the supply was cut off at the end of 3 hours, the cistern would then be emptied in another hour. Find in what time the full cistern would be emptied when there is no supply; the velocity of efflux being considered uniform.

164. A person having to pay £2831 two years hence invests a certain sum in the 3 per cent. consols, to accumulate interest until the debt shall be paid, and also an equal sum the next year. Supposing the investments to be made

when consols are at 73, and the price to remain the same, what must be the sum invested on each occasion that there may be just sufficient to pay the debt at the proper time?

165. Assuming that the value of 2 Tuscan scudi is greater than that of 10½*d.*, and less than that of 11*d.*, and that the value of 1 Austrian swanziger is greater than that of 8*d.*, and less than that of 8½*d.*, prove that the value of 544 Tuscan scudi differs from that of 355 Austrian swanzigers by less than that of 19 Austrian swanzigers.

EXAMINATION PAPERS.

1. Express 16 as a fraction with denominator 9; $\frac{17}{25}$ with denominator 150; $\frac{42}{54}$ with denominator 99.

2. Reduce $\frac{936}{1008}$ and $\frac{19527}{39445}$ to their lowest terms.

3. Multiply £2. 9*s.* $10\frac{3}{8}$*d.* by $10\frac{2}{3}$; prove your result by dividing it by $10\frac{2}{3}$.

4. Divide the continued product of $5\frac{1}{2}$, $\frac{6}{7}$, $9\frac{1}{3}$, and $\frac{16}{35}$ by $3\frac{1}{7}$ of $4\frac{2}{3}$.

5. Arrange in order of value $\frac{3}{5}$, $\frac{6}{11}$, $\frac{9}{22}$, $\frac{17}{30}$.

6. Find the sum of $2\frac{1}{9}$, $4\frac{2}{3}$, $7\frac{5}{18}$, $\frac{7}{12}$, and $3\frac{11}{24}$.

7. Find the difference between $12\frac{3}{7}$ and $8\frac{5}{9}$; also between $3\frac{1}{5}$ of $2\frac{2}{9}$ and $3\frac{1}{5}+2\frac{2}{9}$.

8. What fraction of 8 cwts. 2 qrs. 14 lbs. is 3 qrs. 3 lbs. 8 oz.?

9. Reduce $2\frac{2}{9}$ of 21 po. 1 yd. 1 ft. 6 in. to the fraction of $3\frac{1}{3}$ of 1 fur. 13 po.

10. Find the value of $2\frac{3}{4}$ florins + $5\frac{7}{12}$ half-crowns + $2\frac{5}{14}$ guineas − £$3\frac{3}{8}$.

11. What is the difference between $\frac{2\frac{3}{8}+3\frac{1}{4}}{7\frac{3}{8}-1\frac{5}{6}}$ and

$$\frac{\frac{2}{7}+4\frac{2}{5}\text{ of }\frac{20}{33}}{6\frac{2}{3}-1\frac{5}{6}\text{ of }\frac{20}{33}}?$$

12. In a cricket-match the highest score was $\frac{1}{5}$ of the whole, the next four scores amounted together to $\frac{3}{7}$, the other six to $\frac{12}{35}$, and there were 5 wides. What was the whole score?

II.

1. Write in words 400012001.

2. In a division sum, the divisor is 8796, the quotient 9706, the remainder 3801. What is the dividend?

3. Define a vulgar fraction: from your definition prove that $\frac{3}{4}=\frac{9}{12}$.

4. Reduce $\frac{29205}{43560}$ to its lowest terms.

Simplify $(7\frac{3}{5}-4\frac{2}{9})\div(7\frac{3}{5}\text{ of }4\frac{2}{9})$.

5. Express $7\frac{1}{2}$ crowns as the fraction of 21 half-crowns.

6. If 4 tons 6 cwts. 2 qrs. 18 lbs. be subtracted from 82 tons 6 cwts. 2 qrs. 6 lbs., then from the remainder, and so on; what will be the last remainder?

7. Which is the heavier, a pound of gold or a pound of feathers? and by how much? An ounce of gold or an ounce of feathers? and by how much?

8. If 7¼ shares in a mine are worth £1899. 10*s*., what is the value of 2⅓ of 5½ shares?

9. Divide 55·6591 by 1·813, and 230 by ·016.

10. A tax of £41. 18*s*. 1½*d*. is levied upon a parish, the rents of which amount to £7543. 2*s*. 6*d*.: what tax should be paid by a man whose rents are £346. 17*s*. 6*d*.?

11. Find the value of 156 cwts. 3 qrs. 18 lbs. at £2. 16*s*. 7*d*. per cwt.

12. Out of 200 packages, which cost 8*s*. each, 20 are spoiled, and can only be sold for 3*s*. each; at what rate must the rest be sold so that £4 may be gained on the whole?

III.

1. Divide £21. 15*s*. 8⅗*d*. by 2⅓.

2. Find the value of $\frac{3}{7}$ of $\frac{5}{12}$ of a ton, and $\frac{2}{17}$ of 8½ of $\frac{13}{99}$ of $\frac{1}{3\frac{1}{4}}$ of an acre.

3. Multiply 3·24 by ·0215, and divide 2·134 by ·03125.

4. Find the value of £2·1325, and 13·3125 of 13*s*. 4*d*.

5. Express 13*s*. 9¾*d*. as the decimal of 17*s*.

6. What is the difference between $8{\cdot}21\dot{3}$ of 4*s*. 6*d*., and $3{\cdot}45\dot{0}\dot{9}$ of 11*s*.?

7. Determine which is the least of the fractions $\frac{13}{20}$, $\frac{27}{40}$, $\frac{2}{3}$,

(1) by bringing them to a common denominator;

(2) by reducing them to decimals.

8. Find the price of 28 tons 11 cwts. at £3. 17*s.* 6*d.* per ton.

9. If 3 steps of a soldier measure 2¼ yards, how many steps will he take in 3 miles?

10. If the pay and provisions of 750 soldiers for 12 days amount to £900, how many days will £3000 suffice 2000 soldiers at the same rate?

11. What is the rate per cent. per annum when £562. 10*s.* is the simple interest upon £5000 for 3 years.

12. Find the discount upon a bill for £2857. 10*s.* due 12¼ years hence, at 3½ per cent. per annum.

IV.

1. Reduce 1 mi. 3 fur. 35 po. 1 yd. 1 ft. 6 in. to inches.

2. Find the simple interest upon £447. 16*s.* 3*d.* for 4½ years at 6⅔ per cent. per annum.

3. Express 4 cwts. 3 qrs. 23 lbs. as the fraction of 14 cwts. 3 qrs. 13 lbs.

4. Add together $\frac{6}{13} - \frac{1}{3}$, $10\frac{2}{9}$ of $1\frac{1}{26}$, and $\frac{6\frac{7}{8}}{6\frac{1}{2} + 4\frac{1}{3}}$.

5. Divide 1·56 by 156·25; and subtract $4\cdot15\dot{6}$ from $13\cdot\dot{2}\dot{5}$.

6. Find the value of 3·751875 of £3. 6*s.* 8*d.*

7. Find, by Practice, the value of 337 things at £8. 19*s.* 4*d.* each.

8. How many yards of carpet 3 ft. 4 in. wide will cover the floor of a square room whose side is 20 feet?

9. In what time will £382. 10*s.* produce £32. 6*s.* at 3⅙ per cent. per annum?

10. Goods bought for £208. 7*s.* 8½*d.* are to be sold at a loss of 4 per cent. What is their selling price?

11. *A* and *B* enter into partnership, *A* contributing £2000, *B* £1500. At the end of 4 months they increase their investments by £500 and £1000 respectively. What share should each have out of £405, the profits of a year?

12. What sum of money must be invested in the 3¼ per cents. at 91, to produce an annual income of £400?

V.

1. Find the simple interest upon £3375 for 2⅔ years at 6 per cent. per annum.

2. A room is 20 ft. 9 in. long, 15 ft. 3 in. wide, and 12 ft. high; find the cost of papering it with paper $\frac{2}{3}$ ft. wide, at 4½*d.* a yard.

3. What is the present value of a bill for £1600. 7*s.* 6*d.* due in 15 months from this time at 4 per cent. per annum?

4. Simplify $\cdot 031339 \times 3\cdot\dot{1}\dot{3} \div \frac{62}{351}$.

5. A bankrupt owes £676, his property realizes £31. 5*s.*, and he has debts owing to him to the amount of £480, of which he recovers 14*s.* 6½*d.* in the pound. What dividend can he pay?

6. If a tradesman with a capital of £500 gain £60 in 7 months, how much will he gain in a year with a capital of £420?

7. Distribute £100 among 4 persons *A*, *B*, *C*, and *D*, in such a manner that *B* may receive as much as *A*, *C* as much as *A* and *B* together, and *D* as much as *A*, *B*, and *C* together.

8. Extract the square root of 64009.

9. By selling at 4½ per cent. profit a tradesman gained £47. 14*s.*, what was the prime cost of his goods?

10. How many cubes of which the sides are 2¾ inches can be cut out of a cube of which the side is 22 inches?

11. Two men or five women can do a piece of work in 12 hours, how long will 5 men and 2 women take to do it?

12. *A* can give *B* 5 yards in every 100: how many seconds' start can he give him in a mile race, if *B* can run at the rate of 1 mile in 8 minutes?

VI.

1. Define the Least Common Multiple of two or more numbers, and find the least number which when divided by 3, 10, 12, 14, or 15 will leave a remainder 1.

2. Subtract the sum of 3⅓ of 2½, 5⅔ of 6¼, and 4⅙ from 47.

3. Express 2⅓ of 5*s.* 7½*d.* as the fraction of 1⅔ of 10*s.* 8¼*d.*

4. Divide 4·14 by ·09375, and $\cdot 060\dot{8}5714\dot{2}$ by $\cdot\dot{2}857\dot{1}$.

5. Add together £5·325, 2·06 of 5*s.*, and ·413125 of 16*s.* 8*d.*

6. A rectangular board is 2 ft. 3 in. wide, and contains 24 sq. feet: what is its length?

7. The hold of a vessel being 40 ft. long, 9 ft. wide, and 6 ft. deep, find how many cases it would contain each 2 ft. long, 18 in. wide, and 8 in. deep.

8. Find the compound interest upon £16. 5*s.* 6¼*d.* for 2½ years at 4 per cent. per annum.

9. In what time will the simple interest upon £1200 amount to £210 at 5 per cent. per annum?

10. At what price must cloth, bought at 5*s.* a yard, be sold so as to produce a profit of 12½ per cent.?

11. If 3 men or 5 women can do a piece of work in 20 days, in what time will it be done by 8 men and 20 women working together?

12. *A* and *B* run a 100 yards race, and *A* wins by 2 yards; *C* and *D* run over the same course, and *C* wins by 6 yards; *B* and *D* also run over it, and *B* wins by 4 yards. If *A* and *C* run, which will win, and by how much?

VII.

1. Find the value of 2378 articles at £3. 16*s.* 8½*d.* each.

2. If £1. 6*s.* 11*d.* be paid for 5 cwts. 1 qr. 7 lbs., what will 7 cwts. 2 qrs. cost?

3. In what time will 105 men earn £712. 6*s.* 3*d.*, if 75 men earn the same sum in 63 days?

4. A bankrupt has liabilities to the amount of £6300, while his assets are only £2362. 10*s.*, what dividend will he pay?

5. How many days of 12 hours each would 28 men require to perform a piece of work which would employ 35 men for 60 days of 8 hours each?

6. Find the simple interest upon £2737. 10*s.* for 3 years at 7 per cent. per annum.

7. Find the amount at compound interest upon £1850 for 3 years at 6 per cent. per annum.

8. In what time will £560 gain £91, simple interest being allowed at the rate of 5 per cent. per annum?

9. Find the present value of a bill for £2365 due 2 years hence, at 5 per cent. per annum.

10. Extract the square root of 10246401.

11. By selling cloth at 6*s.* a yard, a tradesman gained 2 per cent. upon his outlay; at what price must he sell the cloth if he wishes to gain $10\frac{1}{2}$ per cent.?

12. A person invests £3682. 15*s.* $0\frac{1}{4}$*d.* in the $3\frac{1}{2}$ per cents. Stocks at 91, and afterwards sells out at 95, what does he gain by the transaction?

VIII.

1. What fraction multiplied by $\frac{2}{5}$ of $1\frac{1}{3}$ of $1\frac{1}{2}$ will produce 1?

2. Reduce $3{\cdot}11\dot{3}\dot{6}$ miles to yards.

3. Find the value of $\dfrac{2\frac{1}{2}-1\frac{1}{3}}{2\frac{1}{4}-\left(\frac{1}{2}\text{ of }3\frac{1}{3}\right)}$ of $\dfrac{4{\cdot}3}{{\cdot}25}$ of 10*s.*

4. What is the value of 43 cwts. 2 qrs. 21 lbs. at £2. 16*s.* 8*d.* per cwt.?

5. If I borrow £391 from a friend for the month of February in leap-year, what sum should I lend him for the next three months to repay the obligation?

6. If the wages of 25 men for 16 days amount to £76. 13*s.* 4*d.*, how many men must work 12 days to receive £103. 10*s.*?

7. What sum of money shall I have to put out to simple interest at 6 per cent. per annum, so as to be able to pay a bill of £812 at the end of 2 years?

8. Divide £28. 4*s*. among A, B, and C, so that for every shilling given to A, B may have 2*s*. and C 3*s*.

9. The daily wages of 6 men and 5 women amount to £1. 15*s*., and each man receives half as much again as a woman; what is the daily wage of each man?

10. What length of paper 2 ft. 6 in. wide is required for the walls of a room 24 ft. long, 16 ft. broad, 12 ft. high?

11. Find the length of the side of a square field which contains 10 acres.

12. If £1100 be laid out in the purchase of $3\frac{1}{2}$ per cent. consols at $82\frac{1}{2}$, at what price must the stock be sold to produce a gain of £100?

IX.

1. Simplify $3\frac{3}{10}+1\frac{1}{9}$ of $\dfrac{3}{20}$ of $1\frac{1}{5}+2\frac{1}{7}$ of $4\frac{2}{3}$.

2. Subtract $\dfrac{2\frac{1}{2}-1\frac{3}{4}}{2\frac{1}{2}+1\frac{3}{4}}$ from $\dfrac{2\frac{1}{7}\times\dfrac{21}{45}}{2\frac{1}{3}\times\dfrac{6}{35}}$.

3. State which of the following will reduce to circulating decimals, and also what is the limit of the number of figures in their periods;

$$\frac{21}{36},\ \frac{20}{37},\ \frac{19}{38},\ \frac{18}{39},\ \frac{17}{40}.$$

4. A room is $19\frac{1}{2}$ ft. long, 18 ft. broad, and $13\frac{1}{2}$ ft. high; find (1) the expense of carpeting the floor at 5*s*. a sq. yd., and (2) the expense of covering the walls with paper which is 2 ft. 3 in. wide, and costs 6*d*. a yd.

5. What is the depth of a square box, which is 1 ft. 6 in. long, and contains 2916 cubic inches?

6. Find the compound interest upon £567. 10*s.* for 2 years and 3 months, at 4 per cent. per annum.

7. In what time will the interest on £416. 13*s.* 4*d.* amount to £70. 16*s.* 8*d.*, at 3 per cent. per annum?

8. *A* starts from Windsor, at 9.15 A.M., to meet *B* who starts from London at 9.30 A.M. If *A* walks 4 miles an hour, and *B* 3½ miles an hour, and the distance between Windsor and London be 21 miles, find at what time they will meet, and what distance each will have walked.

9. A cistern has two pipes which can fill it in 40 min. and 35 min. respectively; if when the cistern is empty the first pipe is to be opened for half an hour, find for how many minutes the other pipe also must be opened that the cistern may be full at the end of the half-hour.

10. If 15 per cent. be lost by selling an estate for £3400, for what must it be sold so as to produce a gain of 20 per cent.?

11. Divide £9. 8*s.* among 12 men, 15 women, and 21 children, so that 4 men shall have the same as 6 women or 9 children.

12. What change of income is made by transferring £3000, from the 4¾ per cents. at 98 to the 4½ per cents. at 94½?

X.

1. What is the cost per hour of lighting a room with ten burners each consuming 4 cubic inches of gas per second, the price of gas being six shillings for a thousand cubic feet?

2. Add $\frac{2}{3}$ of $\frac{4}{5}$ to $\frac{5}{8}$ of $\frac{3}{4}$. Divide $\frac{5}{6}$ of $\frac{1}{3}$ by $\frac{2}{9}$ of 1½. Reduce $\frac{1}{4}$ of $\frac{2}{5}$ of half-a-crown to the fraction of a pound.

3. Reduce (1) to their least common numerator, (2) to their least common denominator, the fractions $\frac{28}{57}, \frac{21}{38}, \frac{35}{76}$, and (3) add them together.

4. Divide 4981·52 by ·073, ·498152 by 73, and $396{\cdot}2\dot{9}\dot{3}$ by $41{\cdot}\dot{9}6\dot{7}$, so as to have 5 decimal places in the quotient.

5. Reduce ${\cdot}\dot{7}6923\dot{0}$ to a vulgar fraction in its lowest terms.

Find by how much $3+\cfrac{1}{7+\cfrac{1}{16}}$ differs from 3·14159.

6. Find the length of the longest chain in terms of which 88 yds. 2 ft. 5 in. and 119 yds. 2 ft. 1 in. can both be expressed as integers.

7. A bankrupt's debts amount to £4380. 12*s.*, and his assets to £912. 12*s.* 6*d.*, what dividend will his creditors receive in the pound?

8. A contractor engaged to make 2½ miles of road in 84 days; but, after employing 60 men for 54 days, he found they had only finished 880 yards: how many additional men must he engage, so that the work may be finished within the prescribed time?

9. Find the difference between the compound and simple interest of £195. 6*s.* 3*d.* for 3 years at 4 per cent. per annum.

10. The interest on a certain sum of money for 2 years is £71. 16*s.* 7½*d.* and the discount on the same sum for the same time is £63. 17*s.*, simple interest being reckoned in both cases: find the rate per cent. and the sum.

11. *A* barters some tea with *B* for flour which is worth

2*s*. 3½*d*. per stone, but uses a false pound-weight of $15\frac{5}{7}$ oz., what value should *B* set upon his flour that the exchange may be fair?

12. *A* leaves £10000 to his eldest son, charged with the payment of £1000 to each of his other 3 children, aged 17, 11, and 9 respectively, when they come of age: find the present value of the elder son's share, reckoning simple interest at 5 per cent. per annum.

ANSWERS.

ANSWERS.

Ex. I.

1. 351; 25672; 2010; 50610; 2789167; 201693; 350007; 2009015; 9000001; 357874231; 730001567; 1075876324; 210005679357; 7913458934899.

2. Two hundred and ninety-seven; thirty-five thousand, eight hundred and ninety-one; twenty thousand, four hundred and five; one thousand and nine; three hundred and fifty-six thousand, eight hundred and ninety-one; seven hundred and five thousand, eight hundred; two million, sixty-seven thousand, eight hundred and ninety-one; three million and twenty; five million, seven hundred and one thousand, nine hundred; thirty million, two thousand, five hundred and eighty-two; one hundred and twenty-one million, five hundred thousand, three hundred and seven; three hundred million, three thousand, and three; seven thousand five hundred and eighty million, seventeen thousand, two hundred and thirty-one; seven hundred thousand and seventy million, seven thousand; one hundred and twenty billion, one thousand two hundred million, twelve thousand.

3. 15; 24; 39; 57; 119; 190; 249; 607; 891; 1509; 2623; 5555; 5021; 6550; 60066; 210440; 290540; 1000010; 25001100.

4. XII; XIX; LVI; CCVIII; DXVII; DCCXL; MCIV; MMDCLXXXIX; $\overline{\text{XV}}\text{CDXCVII}$; $\overline{\text{XX}}\text{XV}$; $\overline{\text{CC}}\text{CL}$; $\overline{\text{DCL}}\text{III}$; $\overline{\text{M}}\text{I}$; $\overline{\text{MM}}\text{MMMLD}$.

Ex. II.

1. 2282; 2397.
2. 499; 409.
3. 13; 35.
4. 252; 1290.
5. 303300; 1073160.
6. 163072; 2182368.
7. 5536; 1442.
8. 3760; 17536.
9. 12990; 59604.
10. 4956; 2075.
11. 559872; 518600.
12. 230; 3396.

Ex. III.

1. £1. 3*s*. 9¼*d*.; £9. 19*s*. 9*d*.
2. 10 guineas 5*s*.; £10. 4*s*. 6*d*.
3. 1 day 4 hrs. 5 min.; 1 yr. 7 days 15 hrs.
4. 1 lb. 11 oz. 2 dwts. 4 grs.; 3 lbs. 1 dwt.
5. 3 oz. 7 drs. 1 scr.; 9 oz. 1 dr. 4 grs.
6. 4 tons 11 cwts.; 18 cwts. 7 lbs. 12 oz. 12 drs.
7. 1 mile 7 fur. 11 yds. 1 ft.; 1 mile 1 fur. 185 yds.
8. 25 ac. 3 ro. 30 po.; 1 sq. yd. 8 sq. ft. 30 sq. in.
9. 12 cub. yds. 1000 cub. in.; 2 cub. yds. 20 cub. ft. 1528 cub. in.
10. 1 bus. 3 pks. 1 qt. 1 pt.; 1 load 1 qr. 5 bus. 2 qts.

Ex. IV.

1. 84; 310.
2. 750; 222.
3. 200; 147.
4. 42; 4833⅓.
5. 227178; 6384.
6. 6; 3.
7. 116 lbs. 8 oz.; 12 lbs. 8 oz.
8. 14 lbs. 7 oz.; 6 drs. 2 scr.
9. 5 dwts.; 3 qrs.
10. 20; 12.

Ex. V.

1. 71 feet; 7333 feet.
2. 4329 inches; 5144 yards.
3. 3308 sq. feet; 98010 sq. inches.
4. 17364 sq. yds; 711360 sq. inches.
5. 3 fur. 36 po. 2 yds; 2 lea. 2 mi. 2 fur. 2 po. 2 yds.
6. 13 po. 3 yds.; 3 po. 2 yds. 1 ft. 6 in.
7. 2 ac. 3 ro. 12 sq. po. 5 sq. yds.; 2 ro. 39 sq. po. 14 sq. yds. 2 sq. ft. 36 sq. in.
8. 11 sq. po. 12 sq. yds. 6 sq. ft. 17 sq. in.; 3 ac. 3 ro. 25 po.

Ex. VI.

1. 5 tons 18 cwts. 2 qrs. 24 lbs.
2. 18 miles 1 fur. 199 yds.
3. 54 acres. 4. 1 lb.
5. 2 pks. 1 gal. 2 qts.
6. 2 lbs. 4 oz. 5 drs. 1 scr. 16 grs.
7. 25 yrs. 41 wks. 3 days. 8. £17. 16*s*. 8½*d*.
9. £65. 12*s*. 10¼*d*. 10. 319 lea. 2 mi. 20 yds.
11. 6075. 12. £367. 3*s*. 9*d*.
13. 452 lbs. 6 oz. 4 dwts. 6 grs.
14. £5667. 19*s*. 6*d*.
15. £14625. 11*s*. 10*d*. 16. £3. 4*s*. 7¼*d*.
17. 17 tons 13 cwts. 3 qrs. 17 lbs.
18. 8 lbs. 3 oz. 7 drs. 19. £1125000.
20. 801 tons 8 cwts. 3 qrs. 21 lbs.
21. 666369; 101001. 22. 25.
23. 16. 24. 154.
25. 2 wks. 6 dys. 12 hrs. 15 min.
26. 12040649055.
27. 13872; 289. 28. 3996840.
29. £37. 0*s*. 10*d*.; £9. 5*s*. 2½*d*.
30. £59. 10*s*.; £3. 14*s*.

Ex. VII.

1. 139.
2. 27.
3. 113.
4. 195.
5. 151.
6. 137.
7. 713.
8. 13.
9. 4.
10. 2.
11. 17.
12. 12.
13. 2.
14. 105.
15. 11.
16. 29.
17. 19.
18. 31.
19. 36.
20. 35.

Ex. VIII.

1. 840.
2. 432.
3. 1428.
4. 1680.
5. 840.
6. 2160.
7. 5400.
8. 2520.
9. 2520.
10. 16800.
11. 17640.
12. 1800.
13. 3360.
14. 27720.
15. 23800.
16. 3556.
17. 6204.
18. 4092.
19. 1560.
20. 10565280.

Ex. IX.

1. $\frac{7}{27}$.
2. $\frac{5}{6}$.
3. $\frac{37}{44}$.
4. $\frac{125}{144}$.
5. $\frac{11}{15}$.
6. $\frac{23}{25}$.
7. $\frac{13}{81}$.
8. $\frac{2}{3}$.
9. $\frac{9}{11}$.
10. $\frac{23}{25}$.
11. $\frac{13}{14}$.
12. $\frac{31}{32}$.
13. $\frac{3}{5}$.
14. $\frac{9}{13}$.
15. $\frac{10}{29}$.
16. $\frac{11}{15}$.
17. $\frac{9}{11}$.
18. $\frac{3}{4}$.

19. $\frac{8}{13}$. 20. $\frac{25}{33}$. 21. $\frac{55}{183}$.

22. $\frac{17}{19}$. 23. $\frac{27}{41}$. 24. $\frac{7}{9}$.

25. $\frac{5}{11}$.

Ex. X

1. $\frac{14}{55}$. 2. $\frac{3}{4}$. 3. $\frac{3}{5}$.

4. $\frac{3}{5}$. 5. $\frac{2}{3}$. 6. $\frac{2}{5}$.

7. $\frac{2}{3}$. 8. $\frac{2}{7}$. 9. $\frac{3}{4}$.

10. $\frac{4}{7}$. 11. $\frac{3}{7}$. 12. $\frac{4}{9}$.

13. $\frac{14}{33}$. 14. $\frac{26}{29}$. 15. $\frac{19}{23}$.

16. $\frac{50}{99}$. 17. $\frac{7}{9}$. 18. $\frac{13}{17}$.

19. $\frac{5}{6}$. 20. $\frac{8}{9}$.

Ex. XI.

1. $3\frac{1}{10}$. 2. $9\frac{1}{3}$. 3. $7\frac{1}{2}$.

4. $2\frac{5}{8}$. 5. $7\frac{4}{5}$. 6. $2\frac{2}{11}$.

7. $2\frac{5}{7}$. 8. 4. 9. 3.

10. $2\frac{7}{13}$. 11. $3\frac{19}{27}$. 12. $4\frac{7}{23}$.

13. $5\frac{1}{15}$. 14. 25. 15. $3\frac{114}{133}$.

16. 4. 17. $22\frac{26}{29}$. 18. $5\frac{75}{76}$.

19. $3\frac{193}{356}$. 20. $3\frac{483}{584}$.

Ex. XII.

1. $\frac{157}{10}$.
2. $\frac{48}{5}$.
3. $\frac{1729}{9}$.
4. $\frac{278}{11}$.
5. $\frac{151}{12}$.
6. $\frac{54}{13}$.
7. $\frac{133}{16}$.
8. $\frac{123}{19}$.
9. $\frac{38}{17}$.
10. $\frac{353}{13}$.
11. $\frac{258}{17}$.
12. $\frac{171}{11}$.
13. $\frac{377}{125}$.
14. $\frac{2605}{59}$.
15. $\frac{784}{25}$.
16. $\frac{359}{16}$.
17. $\frac{1007}{10}$.
18. $\frac{1000007}{1000}$.
19. $\frac{10207}{100}$.
20. $\frac{101112}{101}$.

Ex. XIII.

1. $\frac{14}{2}$, $\frac{35}{5}$, $\frac{63}{9}$.
2. $\frac{48}{4}$, $\frac{60}{5}$, $\frac{144}{12}$, $\frac{52}{4}$, $\frac{65}{5}$, $\frac{156}{12}$.
3. $\frac{153}{9}$, $\frac{289}{17}$, $\frac{357}{21}$; $\frac{196}{14}$, $\frac{112}{8}$, $\frac{364}{26}$.
4. $\frac{169}{13}$, $\frac{91}{7}$, $\frac{91}{13}$, $\frac{49}{7}$; $\frac{12}{1}$, $\frac{36}{3}$, $\frac{84}{7}$, $\frac{19}{1}$, $\frac{57}{3}$, $\frac{133}{7}$.
5. $\frac{35}{42}$, $\frac{55}{66}$, $\frac{75}{90}$.
6. $\frac{8}{26}$, $\frac{52}{169}$, $\frac{132}{429}$.
7. $\frac{3}{9}$, $\frac{5}{15}$, $\frac{6}{18}$.
8. $\frac{492}{600}$, $\frac{246}{300}$, $\frac{328}{400}$, $\frac{41}{50}$.
9. $\frac{54}{6}$, $\frac{4}{6}$, $\frac{1}{6}$.
10. $\frac{6}{8}$, $\frac{6}{8}$, $\frac{8}{8}$.

Ex. XIV.

1. $\frac{16}{43}, \frac{24}{43}, \frac{30}{43}, \frac{40}{43}$.
2. $\frac{6}{37}, \frac{15}{37}, \frac{21}{37}, \frac{36}{37}$.
3. $\frac{8}{27}, \frac{32}{81}, \frac{16}{27}, \frac{8}{9}$.
4. $\frac{3}{16}, \frac{15}{32}, \frac{39}{64}, \frac{27}{32}$.
5. $1\frac{5}{9}, 2\frac{1}{3}, 4\frac{2}{3}, 7$.
6. $4\frac{3}{4}, 6\frac{1}{3}, 10\frac{7}{24}, 15\frac{5}{6}$.
7. £74. 11*s.* 2*d.*
8. £29. 0*s.* $9\frac{3}{5}$*d.*
9. £59. 18*s.* $2\frac{2}{5}$*d.*
10. £160. 19*s.* $4\frac{1}{2}$*d.*
11. £253. 5*s.* $1\frac{7}{8}$*d.*
12. £1995. 14*s.* $4\frac{44}{73}$*d.*
13. £119. 13*s.* 4*d.*
14. £467. 4*s.* $7\frac{5}{12}$*d.*
15. £355. 3*s.* $7\frac{1}{9}$*d.*
16. £474. 17*s.* $4\frac{2}{5}$*d.*
17. £56. 1*s.* $10\frac{2}{3}$*d.*
18. £300. 0*s.* $4\frac{1}{5}$*d.*
19. £199. 7*s.* $10\frac{7}{8}$*d.*
20. £1994. 12*s.* 1*d.*

Ex. XV.

1. $\frac{5}{12}, \frac{5}{18}, \frac{5}{48}, \frac{5}{72}$.
2. $\frac{8}{19}, \frac{4}{19}, \frac{2}{19}, \frac{1}{19}$.
3. $\frac{14}{29}, \frac{28}{87}, \frac{4}{29}, \frac{28}{319}$.
4. $\frac{18}{125}, \frac{3}{25}, \frac{9}{100}, \frac{3}{50}$.
5. $7\frac{7}{16}, 2\frac{1}{8}, 1\frac{1}{16}, \frac{17}{24}$.
6. $6\frac{1}{5}, 2\frac{1}{15}, 1\frac{1}{30}, \frac{31}{40}$.
7. $5\frac{1}{10}, 3\frac{3}{50}, 2\frac{13}{70}, \frac{153}{190}$.
8. $\frac{1}{3}, \frac{7}{54}, \frac{1}{12}, \frac{7}{129}$.
9. £5. 8*s.* $5\frac{2}{5}$*d.*
10. £2. 1*s.* $11\frac{4}{5}$*d.*
11. £1. 11*s.* $7\frac{47}{55}$*d.*
12. £1. 0*s.* $4\frac{13}{40}$*d.*
13. 2*s.* $11\frac{89}{96}$*d.*
14. £7. 12*s.* $0\frac{29}{108}$*d.*
15. £17. 3*s.* $3\frac{13}{84}$*d.*
16. 17*s.* $6\frac{38}{49}$*d.*
17. £1. 12*s.* $10\frac{173}{250}$*d.*
18. £1. 11*s.* $10\frac{13}{85}$*d.*
19. £31. 13*s.* $6\frac{4}{7}$*d.*
20. £2. 1*s.* $9\frac{3}{32}$*d.*

Ex. XVI.

A. (1) $\frac{3}{19}$. (2) 3. (3) $\frac{6}{35}$.

(4) 6. (5) $\frac{8}{25}$. (6) 11.

(7) 20. (8) $\frac{11}{42}$. (9) $1\frac{1}{5}$.

(10) $2\frac{17}{24}$. (11) $\frac{27}{40}$. (12) $1\frac{1}{5}$.

(13) $31\frac{1}{9}$. (14) $\frac{3}{5}$. (15) $2\frac{3}{11}$.

(16) $\frac{27}{40}$. (17) 14. (18) 6.

(19) $15\frac{2}{7}$. (20) $9\frac{37}{45}$.

B. (1) $1\frac{1}{9}$. (2) $2\frac{1}{12}$. (3) $1\frac{23}{27}$.

(4) $10\frac{22}{25}$. (5) $\frac{1}{2}$. (6) 24.

(7) 28. (8) $7\frac{3}{5}$. (9) 120.

(10) $\frac{35}{192}$.

Ex. XVII.

A. (1) $\frac{10}{27}$. (2) $\frac{68}{75}$. (3) $\frac{7}{9}$.

(4) $\frac{19}{48}$. (5) $1\frac{1}{5}$. (6) 16.

(7) $\frac{5}{24}$. (8) $1\frac{8}{39}$. (9) $\frac{1}{3}$.

(10) $5\frac{23}{44}$. (11) $1\frac{13}{20}$. (12) $17\frac{1}{7}$.

(13) $\frac{3}{8}$. (14) $1\frac{1}{14}$.

B. (1) $1\frac{5}{7}$. (2) $\frac{9}{16}$. (3) $\frac{25}{32}$.

(4) $1\frac{1}{2}$. (5) $\frac{15}{22}$. (6) 42.

(7) $\frac{3}{8}$. (8) $1\frac{4}{11}$. (9) 15.

(10) $\frac{1}{6}$. (11) $\frac{7}{26}$. (12) 7.

(13) $37\frac{1}{3}$. (14) $2\frac{7}{24}$. (15) $10\frac{5}{8}$.

(16) $12\frac{8}{11}$. (17) $7\frac{31}{32}$. (18) 40.

(19) $\frac{2}{9}$. (20) $\frac{17}{24}$. (21) $1\frac{21}{34}$.

Ex. XVIII.

A. (1) $\frac{32}{80}$, $\frac{30}{80}$, $\frac{25}{80}$. (2) $\frac{140}{180}$, $\frac{132}{180}$, $\frac{165}{180}$.

(3) $\frac{90}{120}$, $\frac{96}{120}$, $\frac{100}{120}$, $\frac{105}{120}$. (4) $\frac{27}{45}$, $\frac{10}{45}$, $\frac{30}{45}$, $\frac{21}{45}$.

(5) $\frac{42}{150}$, $\frac{55}{150}$, $\frac{80}{150}$, $\frac{9}{150}$. (6) $\frac{40}{540}$, $\frac{30}{540}$, $\frac{420}{540}$, $\frac{81}{540}$.

(7) $\frac{96}{720}$, $\frac{225}{720}$, $\frac{280}{720}$, $\frac{396}{720}$. (8) $\frac{96}{432}$, $\frac{135}{432}$, $\frac{198}{432}$. $\frac{80}{432}$.

(9) $\frac{105}{672}$, $\frac{72}{672}$, $\frac{48}{672}$, $\frac{208}{672}$. (10) $\frac{10}{30}$, $\frac{12}{30}$, $\frac{9}{30}$, $\frac{25}{30}$, $\frac{19}{30}$.

(11) $\frac{140}{180}$, $\frac{75}{180}$, $\frac{135}{180}$, $\frac{162}{180}$, $\frac{70}{180}$.

(12) $\frac{42}{126}$, $\frac{70}{126}$, $\frac{72}{126}$, $\frac{27}{126}$, $\frac{105}{126}$.

(13) $\frac{432}{540}$, $\frac{120}{540}$, $\frac{315}{540}$, $\frac{504}{540}$, $\frac{100}{540}$.

(14) $\frac{297}{726}$, $\frac{24}{726}$, $\frac{154}{726}$, $\frac{66}{726}$, $\frac{15}{726}$.

(15) $\frac{96}{108}$, $\frac{30}{108}$, $\frac{16}{108}$, $\frac{72}{108}$, $\frac{63}{108}$.

B. (1) $\frac{2}{3}$ and $\frac{4}{9}$. (2) $\frac{16}{33}$ and $\frac{9}{22}$.
(3) $\frac{9}{10}$ and $\frac{4}{5}$. (4) $\frac{17}{20}$ and $\frac{8}{15}$.
(5) $\frac{11}{15}$ and $\frac{27}{40}$. (6) $\frac{23}{50}$ and $\frac{11}{30}$.

C. (1) $\frac{23}{42}$, $\frac{10}{21}$, $\frac{4}{9}$, $\frac{3}{7}$. (2) $\frac{2}{9}$, $\frac{7}{32}$, $\frac{3}{16}$, $\frac{1}{6}$.
(3) $\frac{19}{36}$, $\frac{1}{2}$, $\frac{4}{9}$, $\frac{5}{12}$. (4) $\frac{9}{22}$, $\frac{4}{11}$, $\frac{9}{25}$, $\frac{18}{55}$.
(5) $\frac{11}{18}$, $\frac{11}{20}$, $\frac{1}{2}$, $\frac{7}{15}$. (6) $\frac{13}{25}$, $\frac{7}{15}$, $\frac{3}{7}$, $\frac{2}{5}$.
(7) $\frac{1}{4}$ of $1\frac{4}{5}$, $\frac{2}{3}$ of $\frac{9}{16}$, $\frac{1}{15}$ of $5\frac{1}{4}$.
(8) $\frac{1}{3}$ of $2\frac{5}{8}$, $\frac{5}{21}$ of $3\frac{1}{2}$, $1\frac{1}{7}$ of $\frac{1}{4}$.
(9) $\frac{5}{8}$ of $2\frac{2}{7}$, $1\frac{2}{5}$, $3\frac{1}{2}$ of $\frac{5}{14}$ of $\frac{8}{9}$.

Ex. XIX.

A. (1) $\frac{31}{72}$. (2) $1\frac{53}{88}$. (3) $1\frac{19}{180}$.
(4) $3\frac{43}{120}$. (5) $1\frac{59}{112}$. (6) $11\frac{13}{18}$.
(7) $14\frac{1}{112}$. (8) $22\frac{89}{180}$. (9) $14\frac{47}{180}$.
(10) $16\frac{179}{180}$. (11) $13\frac{59}{120}$. (12) $29\frac{7}{18}$.
(13) $12\frac{5}{8}$. (14) $28\frac{14}{15}$. (15) 10.

B. (1) $10\frac{29}{42}$. (2) $11\frac{25}{84}$. (3) $21\frac{11}{15}$.
(4) $29\frac{17}{90}$. (5) $17\frac{7}{12}$. (6) $9\frac{53}{60}$.
(7) $24\frac{1}{180}$. (8) $10\frac{64}{133}$.

C. (1) £50. 0*s*. $0\frac{7}{18}$*d*. (2) £12. 0*s*. $0\frac{7}{24}$*d*.
(3) £24. 2*s*. $3\frac{41}{60}$*d*. (4) £51. 10*s*. $0\frac{3}{8}$*d*.
(5) 2 tons 6 cwts. 1 qr. $25\frac{5}{18}$ lbs.

(6) 28 wks. 2 d. $13\frac{3}{14}$. (7) 19 ac. 3 ro. $14\frac{17}{20}$ po.
(8) 7 bus. 1 pk. $3\frac{19}{24}$ qts.

D. (1) $14\frac{23}{24}$. (2) $37\frac{1}{2}$. (3) $7\frac{14}{15}$.
(4) $2\frac{4}{5}$. (5) $61\frac{19}{24}$. (6) $13\frac{1}{6}$.
(7) $2\frac{284}{315}$. (8) $10\frac{2}{5}$. (9) $11\frac{47}{105}$.
(10) $6\frac{61}{63}$. (11) $12\frac{601}{840}$. (12) $18\frac{7}{9}$.
(13) $12\frac{1}{8}$. (14) $12\frac{1}{10}$. (15) 10.
(16) $15\frac{2}{5}$. (17) $12\frac{1}{6}$. (18) $5\frac{1}{8}$.
(19) $28\frac{17}{18}$. (20) $20\frac{14}{45}$.

Ex. XX.

A. (1) $\frac{1}{20}$. (2) $\frac{1}{16}$. (3) $\frac{5}{63}$.
(4) $\frac{4}{15}$. (5) $\frac{3}{10}$. (6) $\frac{2}{105}$.
(7) $8\frac{1}{18}$. (8) $2\frac{1}{15}$. (9) $1\frac{1}{90}$.
(10) $2\frac{11}{45}$. (11) $3\frac{2}{25}$. (12) $1\frac{17}{100}$.
(13) $1\frac{1}{4}$. (14) $6\frac{3}{5}$. (15) $1\frac{22}{35}$.
(16) $1\frac{7}{12}$. (17) $2\frac{62}{63}$. (18) $3\frac{7}{12}$.
(19) $1\frac{4}{9}$. (20) $2\frac{11}{42}$.

B. (1) $\frac{8}{75}$. (2) $1\frac{27}{70}$. (3) $\frac{7}{9}$.
(4) $1\frac{32}{35}$. (5) $\frac{1}{2}$. (6) $3\frac{13}{15}$.
(7) $\frac{1}{2}$. (8) $\frac{7}{8}$. (9) $\frac{26}{35}$.
(10) $\frac{52}{63}$. (11) $2\frac{4}{5}$. (12) $1\frac{33}{56}$.
(13) $\frac{4}{5}$. (14) $3\frac{245}{576}$. (15) $6\frac{131}{189}$.
(16) $1\frac{41}{90}$. (17) $1\frac{5}{16}$. (18) $7\frac{2}{3}$.

C. (1) £13. 4*s*. $8\frac{1}{6}$*d*. (2) £4. 8*s*. $10\frac{11}{12}$*d*.
(3) £7. 18*s*. $6\frac{5}{6}$*d*. (4) £1. 0*s*. $10\frac{12}{15}$*d*.
(5) £2. 12*s*. $9\frac{24}{35}$*d*. (6) £4. 14*s*. $9\frac{55}{63}$*d*.
(7) £4. 1*s*. $7\frac{58}{99}$*d*. (8) £2. 13*s*. $10\frac{13}{20}$*d*.
(9) 6 lbs. 1 oz. $0\frac{1}{8}$ dr. (10) 1 ton 17 cwts. $93\frac{37}{55}$ lbs.
(11) 3 qrs. $25\frac{5}{6}$ lbs. (12) 1 cwt. 1 qr. 1 lb. $0\frac{5}{6}$ oz.

Ex. XXI.

A. (1) $\frac{7}{60}$. (2) $\frac{1}{90}$. (3) $\frac{61}{90}$.
(4) $\frac{29}{60}$. (5) $3\frac{49}{90}$. (6) $\frac{9}{10}$.
(7) $4\frac{7}{18}$. (8) $5\frac{13}{18}$. (9) $\frac{62}{63}$.
(10) $1\frac{1}{8}$. (11) $6\frac{3}{4}$. (12) $9\frac{13}{128}$.
(13) $7\frac{97}{360}$. (14) $25\frac{61}{72}$. (15) $\frac{2}{3}$.
(16) $55\frac{1}{6}$. (17) $16\frac{13}{30}$. (18) $13\frac{1}{5}$.

B. (1) 2. (2) $\frac{99}{175}$. (3) $\frac{63}{116}$.
(4) $\frac{9}{40}$. (5) $\frac{3}{7}$. (6) $2\frac{24}{43}$.
(7) $\frac{6}{85}$. (8) $3\frac{2}{7}$. (9) $\frac{1}{196}$.
(10) $3\frac{14}{15}$. (11) $2\frac{41}{47}$. (12) $\frac{243}{364}$.
(13) $1\frac{1}{3}$. (14) $6\frac{84}{113}$. (15) $2\frac{3}{5}$.
(16) $1\frac{54}{55}$.

C. (1) $\frac{3}{7}$. (2) $\frac{18}{31}$. (3) $1\frac{1}{5}$.

(4) $\frac{22}{63}$. (5) $2\frac{31}{117}$. (6) $8\frac{2}{3}$.

(7) $3\frac{11}{28}$. (8) $\frac{68}{157}$. (9) $8\frac{2}{7}$.

(10) $4\frac{1}{13}$.

Ex. XXII.

1. 13*s.* $11\frac{1}{7}$*d.*
2. 11 cwts. 1 qr. 21 lbs. $10\frac{2}{3}$ oz.
3. 3 tons 8 cwts. 1 qr. $12\frac{2}{5}$ lbs.
4. £39. 6*s.* $4\frac{4}{5}$*d.* 5. 17 ac. 3 ro. $0\frac{4}{9}$ po.
6. £107. 8*s.* $3\frac{5}{6}$*d.* 7. £98. 19*s.* $11\frac{1}{2}$*d.*
8. 7 cub. yds. 11 cub. ft. $1210\frac{1}{3}$ cub. in.
9. £20. 13*s.* 4*d.* 10. 20 ac. 0 ro. $23\frac{2}{3}$ po.
11. 18*s.* $0\frac{117}{145}$*d.* 12. £25. 14*s.* $6\frac{7}{11}$*d.*
13. £31. 17*s.* $10\frac{1}{2}$*d.* 14. £2. 18*s.* $6\frac{32}{99}$*d.*
15. 4 lbs. 10 oz. 10 dwts. $15\frac{7}{15}$ grs.
16. 1 po. 4 yds. $5\frac{1}{7}$ in. 17. £1. 5*s.* $8\frac{1}{2}$*d.*
18. £1. 19. £8. 2*s.* 1*d.*
20. £5.

Ex. XXIII.

1. $\frac{1}{4}$. 2. $\frac{117}{160}$. 3. $\frac{1}{5}$.

4. $\frac{5}{192}$. 5. $\frac{1}{24}$. 6. $\frac{1037}{1231}$.

7. $\frac{7}{26}$. 8. $\frac{28}{57}$. 9. $\frac{6}{13}$.

10. $\frac{120}{73}$. 11. $\frac{139}{554}$. 12. $\frac{1757}{3960}$.

13. $\frac{25}{46}$. 14. $\frac{57}{424}$. 15. $\frac{147}{346}$.

16. $\frac{1}{6}$. 17. $\frac{11}{13}$. 18. $\frac{138}{293}$.

19. $\frac{1}{9}$. 20. $\frac{78}{331}$.

Ex. XXIV.

1. $\frac{127}{126}$. 2. $\frac{295}{249}$. 3. $\frac{1010}{241}$.

4. $\frac{8}{7}$. 5. $\frac{223}{63}$. 6. $\frac{657}{505}$.

7. $\frac{1295}{1361}$. 8. $\frac{1489}{1010}$. 9. $\frac{211}{172}$.

10. $\frac{2907}{2881}$. 11. $\frac{2}{7}$. 12. $\frac{4}{21}$.

13. $\frac{1}{2}$. 14. $\frac{8392}{3619}$. 15. $\frac{332}{657}$.

16. $\frac{603}{758}$. 17. $\frac{283}{367}$. 18. $\frac{5}{8}$.

19. (i) $\frac{24}{23}$, (ii) $\frac{3}{4}$. 20. $\frac{450}{2993}$.

Ex. XXV.

1. £12. 17*s*. $5\frac{1}{2}$*d*. 2. $4\frac{80}{119}$; $\frac{18}{475}$.

3. (i) $23\frac{5}{21}$, (ii) $\frac{37}{975}$. 4. 1; 1.

5. $\frac{4}{5}$, $\frac{3}{4}$, $\frac{2}{3}$. 6. $\frac{1}{2}$; $\frac{2}{3}$.

7. 1; 1. 8. $\frac{1}{2}$.

9. £4. 14*s*. 11*d*. 10. $\frac{23}{170}$.

11. $\frac{17}{32}$; $13\frac{3}{10}$. 12. $\frac{77}{93}$.

13. £35. 12*s.* $5\frac{1}{2}$*d.*

14. $\frac{1}{2}$.

15. 10*s.*, £1, and 10*s.*

16. (i) 2. (ii) 0.

17. 1.

18. $\frac{1}{20}$.

19. $\frac{43}{60}$.

20. $\frac{2}{21}$.

21. 3 cwts. 1 qr. 6 lbs.

22. 1.

23. $\frac{10}{9}$.

24. $\frac{31}{80}$; $\frac{39}{80}$; $\frac{1}{4}$.

25. £134. 2*s.* 2*d.*

26. $\frac{113389}{394470}$.

27. £3000, £750, £1500, £200.

28. $\frac{99}{4}$; $\frac{181}{1008}$.

29. $\frac{319}{240}$; 960.

30. (i) 1, (ii) $8\frac{3}{124}$, (iii) $22\frac{1}{15}$, (iv) $\frac{117}{140}$.

Ex. XXVI.

A. (1) Three tens, seven units; two hundreds, one ten, six units; five hundred-thousands, four ten-thousands, eight thousands, nine hundreds, seven tens, one unit; three hundreds, six tens, no units; four thousands, no hundreds, five tens, seven units; three hundred-thousands, no ten-thousands, no thousands, five hundreds, no tens, one unit.

(2) Seven tenths; seven tenths, one hundredth; no tenths, seven hundredths, one thousandth; no tenths, seven hundredths, no thousandths, one ten-thousandth; no tenths, no hundredths, no thousandths, no ten-thousandths, nine hundred-thousandths.

(3) Five units, nine tenths; five tens, no units, no tenths, nine hundredths; three hundreds, six tens, one unit, no tenths, no hundredths, seven thousandths; three tens,

two units, no tenths, seven hundredths, five thousandths, nine ten-thousandths; seven units, no tenths, no hundredths, no thousandths, no ten-thousandths, one hundred-thousandth.

B. (1) $\frac{1}{5}$; $\frac{3}{125}$; $\frac{3}{625}$; $\frac{253}{500}$; $\frac{3}{8}$; $\frac{1}{200}$; $\frac{38}{625}$.

(2) $3\frac{17}{100}$; $41\frac{3}{200}$; $376\frac{11}{40}$; $970\frac{1}{25000}$; $7321\frac{101}{2000}$; $2\frac{1321}{2000}$; $301\frac{301}{1000}$.

(3) $72\frac{3}{4}$; $2\frac{14}{25}$; $9\frac{2079}{5000}$; $307\frac{251}{1000}$; $8\frac{73}{80}$; $\frac{87}{400}$; $9\frac{104}{125}$.

C. (1) ·3; ·13; ·407; ·0017; ·00963; ·000009; ·0000047.

(2) 4·7; 55·9; 8·01; 45918·3; 2·1717; 4191·589; 27·5711.

(3) ·057; 23·1; ·0051; ·0303; 27·09; ·0011; 8·77.

D. (1) ·24; 31·5; 181; 40·08.

(2) 76050; 910·2; 14170; 170100.

(3) 1815000; 8; 14120000; 789100.

E. (1) ·0275; ·000081; 3·71; ·008004.

(2) ·0003157; ·0023; ·00000087; ·00003.

(3) ·000000751; ·000000007; ·0000019; ·000256.

F. One tenth; one, and one hundredth; three, and seven thousand five hundred and eighty-one ten-thousandths; eight hundred and fifteen millionths; twenty-seven, and seventy-one thousandths; ten, and five ten-thousandths; seventy-six, and eleven hundred-thousandths.

G. ·15; ·000007; 200·011; 10·00003; ·415; 65000·065; 2·29.

Ex. XXVII.

A. (1) 442·10265; (2) 4852·77877; (3) 269·7538; (4) 634·5529699; (5) 100.

B. (1) 395·66789; (2) 343·42012; (3) 128·478; (4) 346·2531.

C. (1) 740·1258; (2) 388·61818; (3) 356·3652; (4) 668·14.

D. (1) 41·6363; (2) 670·6111; (3) 231·389871; (4) 38·647.

Ex. XXVIII.

A. (1) 4·8241. (2) 266·2106. (3) 16·951081.
(4) 244·13572. (5) 353·407. (6) 128·733.

B. (1) 2·68; ·61215. (2) 1·139; 1·1527.
(3) 2·49; 11·08124.

C. (1) 6·417; 6·3. (2) 17·82; 442·5037.

D. (1) 10·86. (2) 315·188.
(3) ·4 (4) 15·56181.

E. (1) 42·9561. (2) 27·7782. (3) 644·447.
(4) 0. (5) 2·102. (6) 41·41113.

Ex. XXIX.

A. (1) 40·02. (2) 1·0812. (3) 148·78815.
(4) 1082·69869. (5) 310·31442. (6) 1481·617085.

B. (1) ·8499745. (2) 6·240312.
(3) 120·89115. (4) ·0011238573.

C. (1) ·26325. (2) ·0001410816. (3) ·00177089.
(4) 27·080568. (5) ·147168. (6) 32·86164.

D. (1) 179·5. (2) ·000144.
(3) ·26893075. (4) ·0008892.

E. (1) ·8. (2) ·48. (3) ·0093.
(4) 656·44875. (5) 152·4096.

Ex. XXX.

A. (1) 3·07; 30·7. (2) 3·072; 2·421875.
(3) 50·615625; ·006446875. (4) 2·96; 14·96.
(5) ·032; ·00016125. (6) 800; 11218·75.
(7) 7·5; 321·6.

B. (1) 1240; ·30685. (2) 632·8; ·0004735.
(3) ·00075; ·25. (4) 2·008; ·873.
(5) 35; ·000128. (6) ·00625; ·00000078125.
(7) 2·2; ·568.

C. (1) ·00000158; 20200. (2) 6; 6.
(3) 74·84; 7484. (4) ·236875; ·1184375.
(5) 11900000; ·00119. (6) 22600; ·226.
(7) ·026; ·0016.

D. (1) ·008; 1·4375; 150·04.
(2) ·09375; ·002; ·0265625.
(3) 722·625; ·85546875; ·5168.
(4) 9375·18; ·01056; 5·34375.
(5) ·4; 1·328125; ·1128.
(6) 1·37; ·6; ·15625.
(7) 20000; ·007080078125; 2·25.

Ex. XXXI.

A. (1) $\frac{8}{9}$; $2\frac{7}{9}$; $2\frac{7}{99}$; $2\frac{7}{90}$.
(2) $11\frac{77}{90}$; $2\frac{578}{999}$; $3\frac{37}{900}$; $5\frac{896}{999}$.
(3) $\frac{17}{99000}$; $\frac{1007}{9999}$; $\frac{997}{9900}$; $\frac{10079}{99990}$.

B. (1) $\frac{293}{495}$; $\frac{133}{225}$; $\frac{197}{333}$; $\frac{1181}{1998}$.
(2) $2\frac{1}{3}$; $4\frac{1}{22}$; $2\frac{2}{165}$; $\frac{634}{2475}$.
(3) $4\frac{101}{111}$; $3\frac{8}{55}$; $\frac{71}{450}$; $\frac{14}{495}$.
(4) $\frac{2893}{4995}$; $3\frac{107}{110}$; $4\frac{48}{55}$; $3\frac{48}{55}$.

(5) $\frac{5}{666}$; $\frac{1}{132}$; $\frac{17}{2250}$; $\frac{47}{666}$.

(6) $\frac{2}{7}$; $\frac{3}{7}$; $\frac{1}{14}$; $\frac{2}{37}$.

C. (1) $\cdot\dot{4}\dot{6}$; $6\cdot\dot{3}$; $\cdot 29\dot{6}$; $4\cdot\dot{6}0\dot{7}$.
(2) $\cdot\dot{0}\dot{1}$; $\cdot 0\dot{0}1\dot{7}$; $\cdot 00\dot{4}\dot{3}$; $\cdot\dot{0}0\dot{7}$.
(3) $\cdot 0\dot{2}$; $\cdot\dot{3}9$; $\cdot\dot{1}0\dot{3}$; $4\cdot 9\dot{2}\dot{4}$.
(4) $\cdot\dot{4}0\dot{5}$; $\cdot 23\dot{2}6\dot{1}$; $\cdot\dot{0}0926\dot{8}$; $\cdot\dot{0}019405\dot{5}$.
(5) $\cdot 0\dot{3}0769\dot{2}$; $\cdot\dot{1}4285\dot{7}$; $\cdot 0\dot{2}352941176470588$;
$1\cdot\dot{5}806451612903\dot{2}\dot{2}$.
(6) $6\cdot 1\dot{6}$; $\cdot\dot{0}2\dot{7}$; $\cdot 1\dot{0}\dot{9}$; $32\cdot\dot{8}26086956521739130434\dot{7}$.
(7) $1\cdot 2\dot{2}\dot{7}$; $\cdot 61\dot{6}$; $\cdot\dot{5}7142\dot{8}$; $\cdot\dot{0}4761\dot{9}$.

Ex. XXXII.

A. (1) $319\cdot 5\dot{6}\dot{0}$. (2) $56\cdot 73\dot{9}\dot{7}$.
(3) $396\cdot 5\dot{8}88\dot{0}$.

B. (1) $9\cdot\dot{3}\dot{5}$; $9\cdot 3\dot{5}$. (2) $9\cdot 3\dot{5}\dot{6}$; $9\cdot 3\dot{5}\dot{2}$.
(3) $5\cdot\dot{1}$; $5\cdot 1\dot{1}\dot{2}$. (4) $5\cdot 10\dot{8}\dot{7}$; $5\cdot 11\dot{2}\dot{3}$.
(5) $2\cdot 8\dot{7}\dot{6}$; $4\cdot 5\dot{7}\dot{8}$.

C. (1) $196\cdot 4264876$.... (2) $90\cdot 3324934$....

D. (1) $4\cdot 9838\dot{1}93\dot{3}$; (2) $157\cdot 577\dot{9}68\dot{4}$.

Ex. XXXIII.

A. (1) $502\cdot 9\dot{8}$; $\cdot 0\dot{8}44\dot{5}$. (2) $2\cdot 8\dot{4}$; $\cdot 3\dot{1}$.
(3) $\cdot 086\dot{2}$; $36\cdot 1\dot{7}5\dot{3}$. (4) $45\cdot\dot{8}\dot{7}$; $96\cdot\dot{8}$.
(5) $61\cdot\dot{3}6\dot{9}$; $\cdot\dot{0}\dot{9}$. (6) $\cdot\dot{5}$; $24\cdot\dot{4}$.

B. (1) $\cdot 20\dot{9}4\dot{5}$; $6\cdot\dot{2}6936\dot{0}$. (2) $29\cdot 75$; $\cdot 875$.
(3) $2\cdot\dot{7}\dot{9}$; $\cdot\dot{8}292\dot{6}$. (4) $1\cdot 00\dot{0}7\dot{4}$; $1\cdot 241319\dot{4}$
(5) $1\cdot 52\dot{7}$; $47\cdot\dot{3}$. (6) 25; $\cdot\dot{5}7142\dot{8}$.

C. (1) $\cdot 1\dot{2}\dot{0}$; $2\cdot 95$. (2) $\cdot 569\dot{4}$; $16\cdot\dot{1}8\dot{5}$.
(3) $\cdot\dot{0}0\dot{4}$; $\cdot 2$. (4) $92\cdot 5$; $22\cdot 34375$.
(5) $\cdot 68921875$; $\cdot 02674\dot{5}4\dot{9}$. (6) $\cdot\dot{0}0\dot{9}$; $\cdot 5$.

Ex. XXXIV.

1. 5*s.*; 3*s.* 6*d.*; $4\frac{4}{5}$*d.*
2. £1. 3*s.*; £3. 9*s.* $4\frac{1}{2}$*d.*; £5. 12*s.* 3*d.*
3. £30. 4*s.*; 7*s.* 6*d.*; £7. 17*s.*
4. £2. 15*s.* 6*d.*; 8*s.* 9*d.*; £5. 9*s.* $3\frac{3}{4}$*d.*
5. 19 cwts.; 3 yds. 9 in.; 3 lbs. 11 oz. 15 dwts. $19\frac{1}{5}$ grs.
6. 2 furl. 4 po.; 2 cwts. 3 qrs. 7 lbs.; 15 po. 1 yd. 2 ft. $4\frac{7}{20}$ in.
7. £2. 7*s.* 3*d.*; £192. 6*s.* 6*d.*; £39. 5*s.*
8. 11 tons 12 cwts. 2 qrs.; 2 yds. $2\frac{1}{4}$ in.; 2*s.* $4\frac{7}{20}$*d.*
9. £1. 0*s.* 3*d.*; 1 lb. 6 oz. $6\frac{2}{5}$ drs.; £43. 17*s.* 6*d.*
10. £29. 10*s.* $1\frac{1}{5}$*d.*; £17. 10*s.* $7\frac{1}{2}$*d.*; 13*s.* 4*d.*
11. 1*s.* $9\frac{1}{4}$*d.*; 8*s.*; £1. 0*s.* $5\frac{1}{4}$*d.*
12. 5 ft.; 4 ac. 3 ro. 16 po.; 16 qrs. 4 bus.
13. £15. 6*s.* 8*d.*; £4. 3*s.* $0\frac{3}{4}$*d.*; 7*s.* 6*d.*
14. £1. 0*s.* $0\frac{3}{4}$*d.*

Ex. XXXV.

A. (1) ·91875; ·0018375. (2) ·890625; ·5625.
(3) $1{\cdot}3588541\dot{6}$; ·17375. (4) 1·1390625; ·196875.
(5) ·1375; ·53828125. (6) 2·984375; ·359375.
(7) ·156875; 2·556640625. (8) ·96875; ·535.

B. (1) ·375; 1·7. (2) ·1; ·125.
(3) ·16; ·275. (4) 11·55; ·2.
(5) 1·037; 3·4375. (6) ·63; 1·25.
(7) ·01875; ·3. (8) ·625; ·015625.

C. (1) ${\cdot}1\dot{3}$; $3{\cdot}98\dot{3}$. (2) ${\cdot}81\dot{6}$; $38{\cdot}\dot{5}7142\dot{8}$.
(3) ${\cdot}\dot{4}\dot{5}$; $4{\cdot}86\dot{8}\dot{1}$. (4) ${\cdot}141\dot{6}$; ${\cdot}30\dot{6}$.
(5) ${\cdot}267\dot{8}57142\dot{2}$; ${\cdot}502\dot{7}$.
(6) $3{\cdot}19\dot{4}$; $1{\cdot}\dot{5}7894736842105263\dot{1}$.
(7) ${\cdot}2503720\dot{2}3809\dot{5}$; ${\cdot}22488839\dot{2}8571\dot{4}$.
(8) $1{\cdot}1\dot{6}$; $5{\cdot}12\dot{0}3\dot{7}$.

D. (1) 0625 ; $\cdot227655986\ldots$ (2) $30\cdot\dot{4}7619\dot{0}$; $2\cdot5\dot{9}230$
(3) $\cdot\dot{0}\dot{8}$; $71\cdot\dot{7}0\dot{3}$. (4) $3\cdot0\dot{3}$; $\cdot\dot{0}3\dot{6}$.
(5) $\cdot000008\dot{3}$; $\cdot\dot{4}$. (6) $\cdot7625$; $\cdot24375$.
(7) $\cdot0661458\dot{3}$; $\cdot296180\dot{5}$. (8) $\cdot041\dot{6}$; $\cdot\dot{0}8\dot{1}$.

Ex. XXXVI.

1. 500. 2. $\cdot02525$. 3. $\frac{9}{20}$; $\cdot45$. 4. 11.

5. The latter. 6. $\cdot00000032$; $\cdot00081$; $\cdot00081032$; $\cdot0000000002592$. 7. 45 ac. 1 ro. 37⅛ po. 8. $\cdot23541\dot{6}$; $2\cdot\dot{6}$.
9. £2. 13*s.*; $21\cdot2$. 10. $139\cdot675$. 11. $\cdot2\dot{1}2698\dot{4}$.
12. $\cdot0203125$. 13. $\frac{177947}{199800}$; 17*s.* $9\cdot7\dot{5}0\dot{1}$*d.* 14. $\cdot00\dot{1}3\dot{8}$.
16. $\cdot4\dot{7}4\dot{0}$. 17. 3. 18. $151249\cdot7$.

19. (1) Terminating $\frac{67}{128}$, $\frac{65}{130}$: recurring $\frac{66}{129}$, $\frac{64}{131}$.
(2) Terminating $\frac{45}{96}$, $\frac{49}{100}$, $\frac{51}{102}$: recurring $\frac{47}{98}$.

20. (1) $\frac{28}{37}$, 36 figures; $\frac{27}{33}$, 10 figures.
(2) $\frac{17}{21}$, 20 figures; $\frac{155}{1147}$, 36 figures.

Ex. XXXVII.

1. £133. 10*s.*; £147. 15*s.*
2. £80. 13*s.* 4*d.*; £55. 10*s.*
3. £529. 7*s.* 6*d.*; £94. 5*s.*
4. £282. 12*s.*; £563. 13*s.* 4*d.*
5. £9. 5*s.* 6½*d.*; £404. 19*s.*
6. £138. 14*s.* 4*d.*; £49. 9*s.* 7*d.*
7. £1096. 17*s.* 6*d.*; £665. 11*s.* 3*d.*
8. £813. 15*s.*; £350.

16. $\frac{1}{6}$. 17. $\frac{11}{13}$. 18. $\frac{138}{293}$.

19. $\frac{1}{9}$. 20. $\frac{78}{331}$.

Ex. XXIV.

1. $\frac{127}{126}$. 2. $\frac{295}{249}$. 3. $\frac{1010}{241}$.

4. $\frac{8}{7}$. 5. $\frac{223}{63}$. 6. $\frac{657}{505}$.

7. $\frac{1295}{1361}$. 8. $\frac{1489}{1010}$. 9. $\frac{211}{172}$.

10. $\frac{2907}{2881}$. 11. $\frac{2}{7}$. 12. $\frac{4}{21}$.

13. $\frac{1}{2}$. 14. $\frac{8392}{3619}$. 15. $\frac{332}{657}$.

16. $\frac{603}{758}$. 17. $\frac{283}{367}$. 18. $\frac{5}{8}$.

19. (i) $\frac{24}{23}$, (ii) $\frac{3}{4}$. 20. $\frac{450}{2993}$.

Ex. XXV.

1. £12. 17*s*. 5½*d*. 2. $4\frac{80}{119}$; $\frac{18}{475}$.

3. (i) $23\frac{5}{21}$, (ii) $\frac{37}{975}$. 4. 1; 1.

5. $\frac{4}{5}$, $\frac{3}{4}$, $\frac{2}{3}$. 6. $\frac{1}{2}$; $\frac{2}{3}$.

7. 1; 1. 8. $\frac{1}{2}$.

9. £4. 14*s*. 11*d*. 10. $\frac{23}{170}$.

11. $\frac{17}{32}$; $13\frac{3}{10}$. 12. $\frac{77}{93}$.

13. £35. 12*s*. $5\frac{1}{2}$*d*.

14. $\frac{1}{2}$.

15. 10*s*., £1, and 10*s*.

16. (i) 2. (ii) 0.

17. 1.

18. $\frac{1}{20}$.

19. $\frac{43}{60}$.

20. $\frac{2}{21}$.

21. 3 cwts. 1 qr. 6 lbs.

22. 1.

23. $\frac{10}{9}$.

24. $\frac{31}{80}$; $\frac{39}{80}$; $\frac{1}{4}$.

25. £134. 2*s*. 2*d*.

26. $\frac{113389}{394470}$.

27. £3000, £750, £1500, £200.

28. $\frac{99}{4}$; $\frac{181}{1008}$.

29. $\frac{319}{240}$; 960.

30. (i) 1, (ii) $8\frac{3}{124}$, (iii) $22\frac{1}{15}$, (iv) $\frac{117}{140}$.

Ex. XXVI.

A. (1) Three tens, seven units; two hundreds, one ten, six units; five hundred-thousands, four ten-thousands, eight thousands, nine hundreds, seven tens, one unit; three hundreds, six tens, no units; four thousands, no hundreds, five tens, seven units; three hundred-thousands, no ten-thousands, no thousands, five hundreds, no tens, one unit.

(2) Seven tenths; seven tenths, one hundredth; no tenths, seven hundredths, one thousandth; no tenths, seven hundredths, no thousandths, one ten-thousandth; no tenths, no hundredths, no thousandths, no ten-thousandths, nine hundred-thousandths.

(3) Five units, nine tenths; five tens, no units, no tenths, nine hundredths; three hundreds, six tens, one unit, no tenths, no hundredths, seven thousandths; three tens,

3. 2; 3; $7\frac{1}{2}$; 1; $3\frac{1}{3}$; 12·75.
4. 3; $\frac{1}{2}$; 6; $5\frac{1}{4}$; 16; 2·875.
5. 4; 9; 9; 25: 2; 8; 8; 32: 2; $12\frac{1}{2}$; $12\frac{1}{2}$; 50.
6. 4, 3, 12, 9; $2\frac{1}{2}$, $3\frac{1}{5}$, 10, $12\frac{4}{5}$; 4·5, 3·2, 8·75, 6·2.

Ex. XLII.

1. £2. 10*s*.
2. £62. 5*s*. 2*d*.
3. £64. 10*s*.
4. £11. 5*s*.
5. £45. 18*s*.
6. £17. 4*s*. 2*d*.
7. £1. 11*s*.
8. £70.
9. £5. 16*s*. 3*d*.
10. £8. 7*s*. 6*d*.
11. £23400.
12. £25. 6*s*.
13. £34. 10*s*.
14. £22. 1*s*.
15. £25. 10*s*.
16. £95. 17*s*.
17. £264.
18. 60.
19. 12 cwts. 3 qrs.
20. 2 cwts. 2 qrs. 3 lbs. 8 oz.
21. 849.
22. £54. 15*s*. 6*d*.
23. 3*s*. 6*d*. less.
24. £900.
25. $\frac{3}{7}$.
26. 277440; 286688.
27. 16.
28. $10\frac{1}{2}$.
29. $9\frac{3}{4}$ hours.
30. 3 hours.
31. 90.
32. £4200.

Ex. XLIII.

1. £640.
2. 16.
3. 12.
4. 72.
5. 75.
6. 6048.
7. 7.
8. 450.
9. 273 miles.
10. 25.
11. $17\frac{1}{3}$ miles.
12. 96.
13. 9*s*.
14. $5\frac{1}{3}$ days.
15. 576.
16. £600.
17. 8.
18. $7\frac{4}{5}$.
19. 1320 yards.
20. 48 guineas.
21. 100.
22. 448.
23. 15.
24. $16\frac{2}{3}$.

Ex. XLIV.

1. (1) £111. 7*s*. 2*d*. (2) £55. 1*s*.
(3) £43. 11*s*. $6\frac{1}{2}$*d*. (4) 12*s*. $10\frac{1}{2}$*d*.
(5) £225. 9*s*. $8\frac{1}{2}$*d*. (6) £67. 11*s*.
(7) £1516. 17*s*. 7*d*. (8) £97. 10*s*. $6\frac{1}{2}$*d*.
(9) £25. 9*s*. 3*d*. (10) £90. 2*s*. 6*d*.
(11) £84. 9*s*. (12) £183. 6*s*. 8*d*.
2. (1) £975. 2*s*. 6*d*. (2) £689. 9*s*. 6*d*.
(3) £651. 13*s*. 4*d*. (4) £1178. 13*s*. $5\frac{1}{2}$*d*.
(5) £86. 15*s*. 3*d*. (6) £1436. 10*s*.
(7) £409. 15*s*. 8*d*. (8) £1032. 19*s*. 2*d*.
(9) £161. 0*s*. $2\frac{1}{2}$*d*. (10) £2500. 3*s*. 5*d*.
(11) £376. 17*s*. $2\frac{2}{5}$*d*. (12) £17. 17*s*. $8\frac{13}{50}$*d*.
3. £192. 17*s*. $0\frac{4}{5}$*d*. 4. £242. 2*s*. $1\frac{4}{5}$*d*.
5. £1392. 13*s*. $2\frac{4}{5}$*d*. 6. The latter.
7. £8. 8. £52.
9. £22. 10*s*. $10\frac{2}{25}$*d*. 10. £71. 15*s*. $3\frac{53}{100}$*d*.
11. £201. 12. £29. 15*s*. 4*d*.

Ex. XLV.

1. (1) £204. (2) £153. 15*s*.
(3) £12. 16*s*. $9\frac{27}{50}$*d*. (4) £37. 6*s*. $1\frac{7}{8}$*d*.
2. (1) £231. 10*s*. 6*d*. (2) £727. 7*s*. $6\frac{6}{25}$*d*.
(3) £728. 9*s*. $8\frac{8}{25}$*d*. (4) £10095. 13*s*. $1\frac{7}{125}$*d*.
3. (1) £520. 5*s*. (2) £1430. 13*s*. 9*d*.
(3) £104. 17*s*. $5\frac{7}{25}$*d*. (4) £504. 2*s*. $2\frac{22}{25}$*d*.
(5) £115. 10*s*. $3\frac{3006}{3125}$*d*. (6) £311. 19*s*. $3\frac{9}{20}$*d*.
4. (1) £6780. 7*s*. 6*d*. (2) £2206. 9*s*. $3\frac{9}{25}$*d*.
(3) £841. 2*s*. $8\frac{739}{2500}$*d*. (4) £401. 10*s*. $1\frac{2298}{3125}$*d*.
(5) £6274. 0*s*. $0\frac{32}{125}$*d*. (6) £717. 17*s*. $6\frac{4}{25}$*d*.
5. £5. 12*s*. 6*d*. 6. £3. 16*s*. 3*d*.
7. £5. 15*s*. $8\frac{3}{4}$*d*. 8. £1661. 0*s*. $1\frac{1}{2}$*d*.

Ex. XLVI.

1. $3\frac{1}{2}$ years. 2. $4\frac{2}{5}$ years. 3. 4 years.
4. $3\frac{1}{5}$ years. 5. $5\frac{2}{3}$ years. 6. 4 years.
7. $3\frac{1}{3}$ per cent. 8. $5\frac{1}{6}$ per cent. 9. $3\frac{1}{2}$ per cent.
10. $2\frac{3}{5}$ per cent. 11. 4 per cent. 12. $5\frac{1}{3}$ per cent.
13. £500. 14. £213. 6*s*. 8*d*. 15. £857. 10*s*.
16. £525. 17. £1050. 6*s*. 8*d*.
18. £475. 10*s*. 19. $2\frac{1}{2}$ years. 20. $3\frac{1}{3}$ per cent.
21. £177. 1*s*. 8*d*. 22. 5 per cent. 23. £1410.
24. 7. 25. $3\frac{1}{8}$ per cent. 26. $3\frac{83}{95}$ years.
27. £51. 4*s*. $2\frac{10}{11}$. 28. $2\frac{1}{3}$.
29. £142. 19*s*. $10\frac{3}{4}$*d*. 30. $5\frac{3}{4}$ years.

Ex. XLVII.

1. (1) £1100. (2) £700. 16*s*. 8*d*.
(3) £710. 10*s*. 10*d*. (4) £105.
(5) £500. (6) £166. 5*s*.
2. (1) £204. 2*s*. (2) £152. 1*s*. 3*d*.
(3) £126. 19*s*. 6*d*. (4) £111. 1*s*. 8*d*.
(5) £284. 4*s*. 4*d*. (6) £100. 19*s*. 4*d*.
3. (1) £1105. (2) £105. 8*s*. 4*d*.
(3) £1205. 16*s*. 8*d*. (4) £351. 6*s*. 8*d*.
(5) £1215. 8*s*. 4*d*. (6) £594. 1*s*. $2\frac{26}{101}$*d*.
4. (1) £12. 1*s*. 1*d*. (2) £71. 1*s*. 1*d*.
(3) £6. 3*s*. $1\frac{1}{2}$*d*. (4) £15. 10*s*. $2\frac{1}{2}$*d*.
(5) £6. 9*s*. $10\frac{4}{11}$*d*. (6) £27. 10. $2\frac{7}{13}$*d*.
5. £625. 6. £1237. 5*s*.
7. £3. 5*s*. 1*d*. 8. £403. 6*s*. 8*d*.
9. £382. 10*s*. 10. £8. 15*s*.
11. £20. 10*s*. $1\frac{101}{253}$*d*. 12. £2. 8*s*.
13. £55. 12*s*. 6*d*. 14. £35. 18*s*. 6*d*.
15. £2000.

Ex. XLVIII.

1. 114, 171, 285; 742, 848, 954.
2. £583. 6*s.* 8*d.*, £1050, £1866. 13*s.* 4*d.*
3. £60. 3*s.* 6*d.*, £80. 4*s.* 8*d.*, £240. 14*s.*
4. 25, 50, 75, 100. 5. £225, £150, £75.
6. 26⅔, 32, 33⅓. 7. *A* £350, *B* £550, *C* £600.
8. £112. 10*s.*, £87. 10*s.*, £137. 10*s.* 9. £400.
10. £248. 17*s.* 4*d.*, £124. 8*s.* 8*d.*, £31. 2*s.* 2*d.*
11. £266. 13*s.* 4*d.*, £133. 6*s.* 8*d.*,
£66. 13*s.* 4*d.*, £33. 6*s.* 8*d.*
12. *A* £2400, *B* £1200, *C* £200.
13. *A* £216, *B* £648, *C* £432.
14. 24003 oz. oxygen, 2997 oz. hydrogen.
15. Gunpowder 30 cwts.; charcoal 4½ cwts., sulphur 3 cwts.
16. A boy's share £1. 4*s.* 1¾*d.*
A man's share £3. 12*s.* 5¼*d.*
17. A man's share £6. 13*s.* 8¾*d.*
A woman's share 19*s.* 1¼*d.*
18. A child's share £4. 7*s.* 6*d.*
A woman's share £8. 15*s.*
A man's share £26. 5*s.*
19. A man's share £70. 4*s.* 4*d.*
A woman's share £35. 2*s.* 2*d.*
A child's share £17. 11*s.* 1*d.*
20. *A* £421. 8*s.*, *B* £451. 10*s.*
21. *A* £300, *B* £216, *C* £480.
22. *A* £900, *B* £810, *C* £900.
23. *A* £892. 10*s.*, *B* £880.
24. *A* 450 guineas, *B* 550 guineas.
25. In 3½ months. 26. In 4½ months.
27. In 3¾ months.
28. 50 guineas, 60 half-sovereigns, and 90 half-crowns.
29. 10*s.*

30. A man's daily wage 3*s*. $9\frac{5}{6}$*d*.
A woman's daily wage 2*s*. $3\frac{1}{2}$*d*.
A child's daily wage 11*d*.
31. A man's share £8. 6*s*. 8*d*.
A woman's share £5. 11*s*. $1\frac{1}{3}$*d*.
A child's share £2. 15*s*. $6\frac{2}{3}$*d*.
32. A man's share £29. 8*s*. $2\frac{14}{17}$*d*.
A woman's share £14. 14*s*. $1\frac{7}{17}$*d*.
A child's share £4. 18*s*. $0\frac{8}{17}$*d*.
33. *A* £610. 1*s*., *B* £634. 19*s*.
34. *A* £20, *B* £40.
35. A man's share £4. 4*s*.
A woman's share £3.
A child's share £1. 16*s*.

Ex. XLIX.

1. 10 per cent.
2. $13\frac{1}{3}$ per cent.
3. $10\frac{5}{7}$ per cent.
4. $33\frac{1}{3}$ per cent.
5. 4*s*. 6*d*. a lb.
6. £26875.
7. £27625.
8. 19*s*. $4\frac{1}{2}$*d*. a ton.
9. 1*s*. 8*d*. a lb.
10. £4.
11. £2400.
12. 3*s*. 10*d*. a lb.
13. 4*s*. 7*d*.
14. £2926.
15. £54.
16. 5 per cent.
17. 15 per cent.
18. 2 per cent.
19. 14 per cent.
20. $37\frac{1}{2}$ per cent.
21. $33\frac{1}{3}$ per cent.
22. 25 per cent.
23. 10 per cent.
24. 25 per cent.
25. 4 per cent. loss.
26. $37\frac{1}{7}$ per cent.
27. $80\frac{3}{4}$.
28. £1025.
29. £25.
30. 4*s*. 2*d*.

Ex. L.

1. £233. 6*s*. 8*d*. 2. £168.

3. (1) £4625. (2) £200.

4. (1) £1689. 13*s*. 4*d*. (2) £74.

5. 165. 6. £32000. 7. £8200.

8. 120. 9. $3\frac{1}{5}$ per cent. 10. 5 per cent.

11. £250. 12. £260. 8*s*. 4*d*. 13. £262.

14. £85. 6*s*. 8*d*. 15. £11250.

16. £9000. 17. $3\frac{3}{5}$ per cent.

18. $4\frac{1}{3}$ per cent. 19. $112\frac{1}{2}$.

20. 80. 21. The latter.

22. The former. 23. 10 per cents. at 319.

24. 3 per cents. at 95. 25. 4 per cent.; 5 per cent.

26. A gain of £42. 10*s*. 27. £66. 13*s*. 4*d*.

28. A gain of £19. 29. A gain of £46. 14*s*. $1\frac{1}{11}$*d*.

30. A gain of £20.

31. (1) £81. (2) A gain of £3. 5*s*. $9\frac{3}{4}$*d*.

32. £487. 10*s*.

33. (1) He loses £15. (2) A gain of £45.

34. $91\frac{7}{8}$. 35. 80. 36. £2. 2*s*. 6*d*.

37. 80. 38. (1) £3800. (2) £220.

39. A gain of £58. 40. £31. 13*s*. 9*d*.

41. 2 per cent. 42. (1) £25 is lost. (2) A gain of £81.

43. (1) £106. (2) A gain of £118. 8*s*. $5\frac{43}{57}$*d*.

44. A loss of £100.

45. (1) £52. 10*s*. (2) A gain of £58. 6*s*. 8*d*.

46. (1) £420. (2) £12600.

47. It must not exceed $105\frac{7}{8}$.

48. £843. 15*s*.

Ex. LI.

1. 108. 2. 204. 3. 220.
4. $131\frac{3}{4}$. 5. $11\frac{1}{4}$. 6. 40.
7. $43\frac{3}{4}$. 8. 6·72.

Ex. LII.

1. 4 hours: *A*, 18 miles. *B*, 16 miles.
2. In 4 hours: 17 and 14 miles.
3. In 7 hours: *A*, $26\frac{1}{4}$ miles. *B*, $24\frac{1}{2}$ miles.
4. At 1 P.M.: 210 miles.
5. At 3 P.M.
6. 11·55 P.M.: $141\frac{2}{3}$ miles.
7. 36 miles.

Ex. LIII.

1. $3\frac{3}{4}$ days. 2. 4 days.
3. 8 days. 4. $31\frac{1}{2}$ days.
5. 1 day 3 hours. 6. 6 days 8 hours.
7. 15 minutes. 8. In 7 minutes.
9. (1) Half-full; (2) at 2·10 P.M.
10. 14 days.
11. (1) $3\frac{3}{4}$ minutes; (2) $18\frac{3}{4}$ minutes.
12. 16 hours. 13. 2 hours. 15. 2 gallons.

Ex. LIV.

1. 24, 782, 4321. 2. 6789, 3005, 3163.
3. 2005, 43172, 86344. 4. 34·12, 370·09, 490·07.
5. ·4, ·1264..., 8·0531.... 6. ·12, 3·9528..., 1·4491....
7. ·6324..., ·1732..., ·0836....
8. ·0282..., ·0094..., ·003.
9. ·8660..., ·1095..., ·0547....

10. $\cdot\dot{3}$, $\cdot\dot{6}$, $\cdot\dot{9}$.   11. $\cdot 1\dot{3}$, $\cdot 01\dot{6}$, $2\cdot\dot{3}$.

12. $5\cdot\dot{3}$, $\cdot 03\dot{6}$, $\cdot 2\dot{6}$.   13. ·01.

14. 7·6 feet.   15. 3·8 feet.

16. 45 inches.   17. 2185 feet.

18. 10260271849.   19. 3253.   20. 13·9....

Ex. LVI.

1. 14000.   2. 19200.   3. 21236, rem. 1383.

4. 25 lbs. 10 oz. 5$\frac{1}{3}$ drs.   5. £43. 9*s.* 6$\frac{3}{4}$*d*; £999. 19*s.* 11$\frac{1}{4}$*d.*

6. 2; 1·5.   7. £49. 9*s.* 7*d.*; £4. 10*s.* 5*d.*

8. 24.   9. $\frac{16}{1125}$; $\cdot 014\dot{2}$.   10. 75.   11. $\frac{571}{1250}$; ·275.

12. £1153. 19*s.*; £444. 16*s.* 8*d.*; £719. 11*s.* 8*d.*

13. 280 sovereigns, 3*s.*, 6*d.*, 168 farthings.

14. 12 stone.   15. 4*s.* 2*d.*   16. 500; ·06.

17. 15435; $\frac{1}{5}$.   18. 7 oz. 17$\frac{3}{14}$ dwts.

19. 174954 in.; 2 fur. 8 po. 4 yds. 2 ft.

20. 7 fur. 35 po. 2 yds. 2 ft.; 9 sq. po. 30 yds. 2 ft. 37 in.

21. 5$\frac{1}{12}$.   22. $\frac{5}{9}$, $\frac{5}{12}$, $\frac{1}{4}$, $\frac{3}{16}$; $\frac{5}{12}$, $\frac{3}{10}$, $\frac{1}{5}$, $\frac{2}{15}$.

23. $\frac{17}{25}$.   24. 6; 1$\frac{11}{60}$.   25. £12. 5*s.* 10$\frac{5}{8}$*d.*

26. £27. 10*s.*   27. £271. 1*s.* 6*d.*

28. 58 sq. yds. 3 ft.; 184 sq. yds.

29. ·26325; 250.   30. $\cdot 1898\dot{1}\dot{4}$; 142.

31. £897. 3*s.* 7$\frac{5}{6}$*d.*   32. 150 sq. yds.; £14. 8*s.* 9*d.*

33. 3$\frac{17}{20}$; 2$\frac{16}{35}$.   34. $16\cdot\dot{1}8\dot{1}$.

35. £392. 5*s.*   36. £81. 5*s.*

37. £479. 7*s.* 11$\frac{16}{25}$*d.*   38. £143. 8*s.* 0$\frac{3}{8}$*d.*

39. £18. 15*s.*, £25.   40. 33$\frac{1}{3}$ per cent.

41. 211.   42. 3*s.* 6*d.*

43. ·75; $1·\dot{3}$; ·196875. 44. $12\frac{25}{96}$; $\frac{169}{200}$.
45. ·02; 20000; ·2. 46. 190 yds.
47. £1750. 48. £970. 16*s.* 8*d.*
49. £1. 5*s.* 50. 36 sq. yds.; 175 sq. yds.
51. 73 po. 1 yd. 2 ft. 6 in.
52. 25 : 8. 53. ·75.
54. £16000. 55. £6000. 56. £1. 6*s.* 6*d.*
57. $\frac{69}{550}$; $·32331\dot{3}4920\dot{6}$. 58. £360.
59. $10\frac{187}{200}d.$
60. 10·0191; 10·0009; ·091091; 1100; $·00\dot{0}\dot{9}$.
61. 5570 po. 1 yd. 1 ft.
62. 24. 64. £871.
65. £68. 14*s.* 4*d.*; £2. 11*s.* 4*d.*
66. £250, £62. 10*s.*, £15. 12*s.* 6*d.*
67. £4200. 68. £6. 7*s.* 1*d.*
69. $\frac{1}{3}$; $\frac{31}{30}$; $\frac{622}{495}$; 2·67.
70. £129. 6*s.* $4\frac{44}{75}d.$
71. Each man $11\frac{1}{4}$ lbs., each woman $7\frac{1}{2}$ lbs.
72. £66. 19*s.* $4\frac{1}{2}d.$
73. £104. 19*s.* $11\frac{5}{8}d.$; £100. 1*s.* $2\frac{1054}{1689}d.$
74. 173 ac. 2680 yds. 75. £2222. 4*s.* $5\frac{1}{3}d.$
76. $3\frac{3}{4}$ per cent.; £328. 19*s.* $6\frac{51}{128}d.$
77. 40. 78. £9. 10*s.* $5\frac{5}{7}d.$; £9. 1*s.* $9\frac{9}{11}d.$
79. £15000. 80. ·056875.
81. The latter. 82. $1\frac{13}{30}$.
83. £7. 14*s.* $8\frac{1}{4}d.$ 84. ·184375; $\frac{2527}{5025}$.
85. 20·85. 86. £392162. 4*s.* $8\frac{1}{2}d.$
87. $4\frac{1}{2}$ per cent. per annum.
88. $2\frac{17}{54}$ years. 89. £62. 2*s.*

90. £14. 1*s*. $2\frac{1}{4}$*d*. 91. $7\frac{1}{8}$*d*. a lb.
92. At 5 o'clock; At 1 o'clock.
93. £2000. 94. 997·223... oz.
95. 1612. 96. 3*s*. $4\frac{1}{2}$*d*.
97. $3\frac{5}{8}$ per cent. 98. $7\frac{1}{2}$ per cent.
99. 250, 350, and 400 guineas.
100. £400. 101. 131°.
102. $3\frac{1}{8}$. 103. £3. 3*s*.
104. £400, £300, £200.
105. $7\frac{1}{2}$. 106. £46. 17*s*. 6*d*.; $1\frac{1}{4}$, $33\frac{1}{3}$.
107. 24000. 109. 4 per cent. per annum.
110. 1·25... lbs. 111. 10 miles an hour.
112. 103 dys. 17 hrs. 37 min.
113. $1\frac{1}{2}$ miles; 1 hour.
114. 80. 115. £1578. 4*s*.
116. 30 per cent.
117. £55. 5*s*. 5*d*., £33. 3*s*. 3*d*., £11. 1*s*. 1*d*.
118. £303. 119. £882. 11*s*. $8\frac{68}{125}$*d*.
120. $6\frac{1}{2}$. 121. 390.
122. 21 tons 1 cwt. 3 qrs. 14 lbs.
123. 729 : 640. 124. 1 hr. 45 min.
125. £135. 126. 24 days.
127. £281. 5*s*. : £6. 8*s*. $3\frac{27}{32}$*d*.
128. $2\frac{1}{2}$ per cent. 129. £1254. 3*s*. 4*d*.
130. 5*s*. 10*d*. 131. $1174\frac{1}{2}$ sq. ft.; £5. 6*s*. $4\frac{11}{12}$*d*.
132. 4·472..., 9·273..., ·141....
133. 2530·6. 134. £7. 19*s*.
135. £82. 11*s*. $0\frac{1}{4}$*d*. 136. £200.
137. $\cdot538\dot{5}8024691\dot{3}$. 138. 13*s*. 2*d*.
139. £12. 10*s*. 3*d*. 140. $385\frac{1}{3}$ sq. yds.
141. £60. 142. 30.
143. 18 days. 144. $21212\frac{4}{33}$ yards.
145. £146. 19*s*. $3\frac{3}{5}$*d*. 146. £520.

147. £5333. 6*s*. 8*d*., £4000, £3800.

148. 12*s*. 3*d*.

149. 36 : 35; $15\frac{3}{7}$ min.; $\frac{1}{16}$ mile.

150. £2000.

151. £110; 150 per cent. per ann.

152. A gain of £73. 14*s*. $11\frac{23}{35}$*d*.

153. $4\frac{1}{2}$*d*. 154. £818. 8*s*.

155. £6666. 13*s*. 4*d*. 156. $\frac{1}{10}$.

157. £1176. 158. £600.

159. A child, £1920. 12*s*.; a brother, £960. 6*s*.

160. 2*d*. 161. 15*d*.; $15\frac{15}{38}$*d*.

162. 3920400000. 163. 3 hours.

164. £1332. 5*s*.

EXAMINATION PAPERS.

I.

1. $\frac{144}{9}$; $\frac{102}{150}$; $\frac{77}{99}$. 2. $\frac{13}{14}$; $\frac{849}{1715}$.

3. £25. 9*s*. $11\frac{1}{45}$*d*. 4. $1\frac{13}{35}$.

5. $\frac{3}{5}$, $\frac{17}{30}$, $\frac{6}{11}$, $\frac{9}{22}$. 6. $17\frac{29}{36}$.

7. $3\frac{46}{63}$; $1\frac{21}{45}$. 8. $\frac{25}{276}$.

9. $\frac{156}{583}$. 10. 1*s*. $5\frac{1}{2}$*d*.

11. $\frac{3}{28}$. 12. 175.

II.

1. Four hundred million, twelve thousand and one.

2. 85377777. 4. $\frac{59}{88}$; $\frac{2}{19}$.

5. $\frac{5}{7}$.
6. 0.
7. A pound of feathers by 1240 grains; an ounce of gold by $42\frac{1}{2}$ grains.
8. £3362. 6*s*. 8*d*.
9. 30·7; 14375.
10. £1. 18*s*. $6\frac{1}{2}$*d*.
11. £443. 18*s*. $6\frac{3}{8}$*d*.
12. 9*s*.

III.

1. £9. 6*s*. $8\frac{22}{35}$*d*.
2. 3 cwts. 2 qrs. 8 lbs.; 195 sq. yds. 5 ft.
3. ·06966, 68·288.
4. £2. 2*s*. $7\frac{1}{5}$*d*., £8. 17*s*. 6*d*.
5. ·8125.
6. 1*s*.
7. $\frac{13}{20}$.
8. £110. 12*s*. $7\frac{1}{2}$*d*.
9. 7040.
10. 15.
11. $3\frac{3}{4}$.
12. £857. 10*s*.

IV.

1. 94104 inches.
2. £134. 6*s*. $10\frac{1}{2}$*d*.
3. $\frac{1}{3}$.
4. $11\frac{59}{156}$.
5. ·009984; $9{\cdot}09\dot{5}\dot{8}$.
6. £12. 10*s*. $1\frac{1}{2}$*d*.
7. £3021. 15*s*. 4*d*.
8. 40.
9. $2\frac{2}{3}$ years.
10. £200. 1*s*.
11. *A* £210, *B* £195.
12. £11200.

V.

1. £540.
2. £8. 2*s*.
3. £1524. 3*s*. 4*d*.
4. ·555555.
5. 11*s*. 3*d*.
6. £86. 8*s*.

7. *A* £12. 10*s.*, *B* £12. 10*s.*, *C* £25, *D* £50.
8. 253.
9. £1060.
10. 512.
11. 4$\frac{4}{25}$ hours.
12. 24.

VI.

1. 421.
2. $\frac{3}{4}$.
3. $\frac{2}{3}$.
4. 44·16 ; ·213.
5. £6. 3*s.* 8$\frac{9}{40}$*d.*
6. 10 ft. 8 in.
7. 1080.
8. £1. 13*s.* 7$\frac{1}{4}$*d.*
9. 3$\frac{1}{2}$ years.
10. 5*s.* 7$\frac{1}{2}$*d.*
11. 3 days.
12. *C*, by $\frac{25}{294}$ of a yard.

VII.

1. £9120. 12*s.* 5*d.*
2. £1. 18*s.*
3. 45 days.
4. 7*s.* 6*d.* in the £.
5. 50.
6. £574. 17*s.* 6*d.*
7. £2203. 7*s.* 7$\frac{13}{125}$*d.*
8. 3$\frac{1}{4}$ years.
9. £2150.
10. 3201.
11. 6*s.* 6*d.* a yard.
12. £161. 17*s.* 7*d.*

VIII.

1. $\frac{5}{4}$.
2. 5480 yards.
3. £17. 4*s.*
4. £123. 15*s.* 7$\frac{1}{2}$*d.*
5. £123. 5*s.*
6. 45.
7. £725.
8. *A* £4. 14*s.*, *B* £9. 8*s.*, *C* £14. 2*s.*
9. 3*s.* 9*d.*
10. 128 yds.
11. 220 yds.
12. 90.

IX.

1. $13\frac{1}{2}$. 2. $2\frac{11}{34}$.

3. $\frac{21}{36}$ (limit, 11 figures), $\frac{20}{37}$ (limit, 36 figures), $\frac{18}{39}$ (limit, 12 figures).

4. £9. 15*s.*; £3. 15*s.* 5. 9 inches.

6. £52. 8*s.* $11\frac{37}{625}$. 7. $5\frac{2}{3}$ years.

8. At 12·10 P.M.; *A* $11\frac{2}{3}$ miles, *B* $9\frac{1}{3}$ miles.

9. $8\frac{3}{4}$. 10. £4800.

11. A man 6*s.*, a woman 4*s.*, a child 2*s.* 8*d.*

12. A loss of £2. 10*s.*

X.

1. 6*d.* 2. $1\frac{1}{480}$; $\frac{5}{6}$; $\frac{1}{80}$.

3. $\frac{420}{855}$, $\frac{420}{760}$, $\frac{420}{912}$; $\frac{112}{228}$, $\frac{126}{228}$, $\frac{105}{228}$; $1\frac{115}{228}$.

4. 68240, ·006824, 9·44277...

5. $\frac{10}{13}$; ·00000292035... 6. 3 yds. 2 ft. 7 in.

7. 4*s.* 2*d.* 8. 372.

9. 19*s.* 10. $6\frac{1}{4}$, £574. 13*s.*

11. 2*s.* 4*d.* a stone. 12. £7875.

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